SECTION 8.0

Environmental Information

SECTION 8.0

Environmental Information

The following subsections, 8.1 through 8.16, provide the environmental information required for the CVEC Application:

8.1 Air Quality

8.2 Biological Resources

8.3 Cultural Resources

8.4 Land Use

8.5 Noise

8.6 Public Health

8.7 Worker Health and Safety

8.8 Socioeconomics

8.9 Agriculture and Soils

8.10 Traffic and Transportation

8.11 Visual Resources

8.12 Hazardous Materials

8.13 Waste Management

8.14 Water Resources

8.15 Geological Hazards and Resources

8.16 Paleontological Resources

SUBSECTION 8.1

Air Quality

8.1 Air Quality

This section describes existing air quality conditions, maximum potential impacts from the project, and mitigation measures that keep these impacts below thresholds of significance. The project will use combined-cycle generation technology to generate electricity in a manner that will minimize the amount of fuel needed, emissions of criteria pollutants, and potential effects on ambient air quality.

Other beneficial environmental aspects of the project that minimize adverse air quality include the following:

- Clean-burning natural gas as fuel.
- Selective catalytic reduction (SCR) and dry low NO_x combustors to minimize NO_x emissions.
- Oxidation catalysts to reduce carbon monoxide emissions.
- Appropriately sized stacks to reduce ground-level concentrations of exhaust constituents.

This section presents the methodology and results of the air quality analyses performed to assess potential impacts associated with air emissions from the construction of the project. Potential public health risks posed by emissions of non-criteria pollutants are also addressed in Section 8.6 (Public Health).

Section 8.1.1 presents the air quality setting, including geography, topography, climate, and meteorology. Section 8.1.2 provides an overview of air quality standards and health effects. Section 8.1.3 discusses the criteria pollutants and existing air quality in the vicinity of the proposed project. The affected environment is analyzed in Section 8.1.4, and air quality regulatory agencies relevant to the project are identified; the LORS that can affect the project and project conformance are also identified in Section 8.1.4. Section 8.1.5 discusses the environmental consequences of emissions from the project and describes the procedures used in assessing facility emissions and air quality impacts. The screening health risk assessment, visibility screening analysis, and construction impacts analysis are also discussed. Section 8.1.6 discusses compliance with LORS applicable to the project. An analysis of cumulative impacts is presented in Section 8.1.7. Mitigation for project air quality impacts is discussed in Section 8.1.8. A list of references used in preparing the section is provided in Section 8.1.9.

8.1.1 Air Quality Setting

8.1.1.1 Geography and Topography

The proposed project will be located on a triangular plot just south of the western Fresno County town of San Joaquin. The 85-acre site is bounded by S. Colorado and Springfield Avenue. The nearest residences are within a quarter mile of the north end of the project site.

The project site is level, at an elevation of approximately 170 feet above sea level. The terrain is flat on all sides of the site. The foothills of the Coast Range lie approximately 20 miles southwest of the project site.

8.1.1.2 Climate and Meteorology

The climate of the San Joaquin Valley is characterized by hot summers, mild winters, and small amounts of precipitation. The major climatic controls in the Valley are the mountains on three sides and the semipermanent Pacific High pressure system over the eastern Pacific Ocean. The Great Basin High pressure system to the east also affects the Valley, primarily during the winter months. These synoptic scale influences result in distinct seasonal weather characteristics, as discussed below.

The Pacific High is a semipermanent subtropical high pressure system located off the Pacific Coast. It is centered between the 140°W and 150°W meridians, and oscillates in a north-south direction seasonally. During the summer, it moves northward and dominates the regional climate, producing persistent temperature inversions and a predominantly southwesterly wind field. Clear skies, high temperatures, and low humidity characterize this season. Very little precipitation occurs during summer months, because migrating storm systems are blocked by the Pacific High. Occasionally, however, tropical air moves into the area and thunderstorms may occur over the adjacent mountains.

In the fall, the Pacific High weakens and shifts southwestward toward Hawaii, and its dominance is diminished in the San Joaquin Valley. During the transition period, the storm belt and zone of strong westerly winds also moves southward into California. The prevailing weather patterns during this time of year include storm periods with rain and gusty winds, clear weather that can occur after a storm or because of the Great Basin High pressure area, or persistent fog caused by temperature inversion. The average annual rainfall at the project site is approximately 7 inches, of which approximately 70 percent falls in the four months of December through March. Temperature, winds, and rainfall are more variable during the fall and winter months, but also stagnant conditions occur more frequently than during summer. (*Climates of the States – California*, U.S. Department of Commerce, Weather Bureau, 1959)

Temperature, wind speed, and wind direction data in the area of the proposed project were recorded between 1992-1995 and 1997 at the Lemoore Naval Air Station (NAS), 38 km SE of the project site.

Wind and mixing height are two key meteorological parameters that govern the potential for air pollution problems. The predominant winds in California are shown in Figures 8.1-1 through 8.1-4 (The Uses of Meteorological Data in Large-Scale Air Pollution Surveys, Stanford Research Institute, 1958). As the figures indicate, winds in California are generally light and easterly in the winter, but strong and westerly in the spring, summer, and fall.

Wind patterns at the project site are presented in Figure 8.1-5a through 5e, which show annual and quarterly wind roses for the Lemoore NAS meteorological data collected over a five-year period. The windroses indicate a fairly consistent diurnal cycle associated with a modified sea breeze passing through the San Joaquin/Sacramento Delta into the San Joaquin Valley ("Delta" breeze), with a reasonable occurrence of high wind speeds (over 10 percent of wind speeds are greater than 5.4 m/s) and a predominant wind direction of north through west-northwest. Approximately 18 percent calm hours were observed at the site during this five-year period.

Marine influences can affect mixing heights. Often the base of an inversion is found at the top of a layer of marine air because of the cooler nature of the marine environment. Inland areas, however, where the marine influence is weak or nonexistent, often experience strong ground-based inversions, which inhibit mixing and can result in high pollutant concentrations. Such is the case in Fresno, at least during morning hours. Smith, et al (1984), reported that at Fresno, 50th percentile <u>morning</u> mixing heights for the period 1979-80 were 115-150 meters (approximately 375-495 feet) in the fall and winter, 230 meters (755 feet) in the spring, and 175 meters (575 feet) in the summer. Such low mixing heights trap pollutants. The 50th percentile <u>afternoon</u> mixing heights, however, were unlimited in spring and summer, 1135 meters (3,725 feet) in the fall, and 630 meters (2,065 feet) in the winter. Such mixing heights provide generally favorable conditions for the dispersion of pollutants.

8.1.2 Overview Of Air Quality Standards

The U.S. Environmental Protection Agency (USEPA) has established national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter with aerodynamic diameter less than or equal to 10 microns (PM_{10}), particulate matter with aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$), and airborne lead. Areas with air pollution levels above these standards can be considered "nonattainment areas" subject to planning and pollution control requirements that are more stringent than standard requirements.

In addition, the California Air Resources Board (ARB) has established standards for ozone, CO, NO_2, SO_2, sulfates, PM_{10}, airborne lead, hydrogen sulfide, and vinyl chloride at levels designed to protect the most sensitive members of the population, particularly children, the elderly, and people who suffer from lung or heart diseases.

Both state and national air quality standards consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is to be measured. Allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposures to a high concentration for a short time (one hour, for instance), or to a relatively lower average concentration over a longer period (8 hours, 24 hours, or 1 month). For some pollutants there is more than one air quality standard, reflecting both short-term and long-term effects. Table 8.1-1 presents the NAAQS and California ambient air quality standards for selected pollutants. The California standards are generally set at concentrations much lower than the federal standards and in some cases have shorter averaging periods.

USEPA's new NAAQS for ozone and fine particulate matter went into effect on September 16, 1997. For ozone, the previous one-hour standard of 0.12 ppm was replaced by an eight-hour average standard at a level of 0.08 ppm. Compliance with this standard will be based on the three-year average of the annual 4th-highest daily maximum eight-hour average concentration measured at each monitor within an area.

The NAAQS for particulates were revised in several respects. First, compliance with the current 24-hour PM_{10} standard will now be based on the 99th percentile of 24-hour concentrations at each monitor within an area. Two new $PM_{2.5}$ standards were added: a standard of 15 $\mu g/m^3$, based on the three-year average of annual arithmetic means from single or multiple monitors (as available); and a standard of 65 $\mu g/m^3$, based on the three-year average of the 98th percentile of 24-hour average concentrations at each monitor within an area.

Recent court decisions have delayed the implementation of these new standards.

TABLE 8.1-1
Ambient Air Quality Standards

Pollutant	Averaging Time	California	National
Ozone	1 hour	0.09 ppm	0.12 ppm
	8 hours	-	0.08 ppm (3-year average of annual 4th-highest daily maximum)
Carbon Monoxide	8 hours	9.0 ppm	9 ppm
	1 hour	20 ppm	35 ppm
Nitrogen Dioxide	Annual Average	-	0.053 ppm
	1 hour	0.25 ppm	-

TABLE 8.1-1
Ambient Air Quality Standards

Pollutant	Averaging Time	California	National
Sulfur Dioxide	Annual Average	-	80 μg/m^3 (0.03 ppm)
	24 hours	0.04 ppm (105 μg/m^3)	365 μg/m^3 (0.14 ppm)
	3 hours	-	1300[a] μg/m^3 (0.5 ppm)
	1 hour	0.25 ppm	-
Suspended Particulate Matter (10 Micron)	Annual Geometric Mean	30 μg/m^3	-
	24 hours	50 μg/m3	150 μg/m^3
	Annual Arithmetic Mean	-	50 μg/m^3
Suspended Particulate Matter (2.5 Micron)	Annual Arithmetic Mean	-	15 μg/m^3 (3-year average) 65 μg/m^3
	24 hours	-	(3-year average of 98th percentiles)
Sulfates	24 hours	25 μg/m^3	-
Lead	30 days	1.5 μg/m^3	-
	Calendar Quarter	-	1.5 μg/m^3
Hydrogen Sulfide	1-hour	0.03 ppm	-
Vinyl Chloride	24-hour	0.010 ppm	-
Visibility Reducing Particles	8-hour (10am to 6pm PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.	-

[a] This is a national secondary standard, which is designed to protect public welfare.

8.1.3 Existing Air Quality

All ambient air quality data are taken from data published by ARB (on the ADAM website) and the USEPA (on the AIRS website). Ambient concentrations of ozone, NO_2, SO_2, CO, PM_{10} and fine particulates ($PM_{2.5}$) are recorded at a monitoring station in Fresno, approximately 24 miles northeast of the proposed project site. SO_2 and sulfates are monitored in Bakersfield, and ambient lead data are available for Sacramento, Bakersfield, and Fresno. The Fresno and Bakersfield monitoring stations are operated by the ARB, and the Sacramento station by the Sacramento Metropolitan Air Quality Management District (SMAQMD). The locations of the monitoring stations relative to the proposed project are such that emissions measurements recorded at the monitoring stations are believed to represent area-wide ambient conditions rather than the localized impacts of any particular facility.

8.1.3.1 Ozone

Ozone is an end product of complex reactions between volatile organic compounds (VOC) and oxides of nitrogen (NO_x) in the presence of intense ultraviolet radiation. VOC and NO_x emissions from millions of vehicles and stationary sources, in combination with daytime wind flow patterns, mountain barriers, a persistent temperature inversion, and intense sunlight result in high ozone concentrations. For purposes of state and federal air quality planning, the San Joaquin Valley Air Basin is a nonattainment area for ozone.

Maximum ozone concentrations at the Fresno station are usually recorded during the summer and fall months. Table 8.1-2 shows the annual maximum hourly ozone levels recorded at this monitoring station during the period 1991-2000, as well as the number of days in which the state and federal standards were exceeded. The data show that during the last half of the 1990s the state ozone air quality standard was exceeded on about 15 percent of the days in the year. The federal standard is violated only a few days per year.

The long-term trends of maximum one-hour ozone readings and violations of the state standard are shown in Figures 8.1-6 and 8.1-7 for the Fresno station. The figures indicate that maximum hourly ozone levels persist at a level about 50 percent above the state standard, and about 20 percent above the NAAQS.

TABLE 8.1-2
Ozone Levels In Fresno, 1991-2000 (ppm)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highest 1-Hour Average	0.18	0.14	0.16	0.14	0.17	0.15	0.13	0.15	0.14	0.14
Number of Days Exceeding										
State Standard (0.09 ppm, 1-hour)	76	56	59	56	65	59	30	46	53	45
Federal Standard (0.12 ppm, 1-hour)	27	12	11	7	14	15	1	15	4	4

Sources: California Air Quality Data, California Air Resources Board website; USEPA AIRS website.

8.1.3.2 Nitrogen Dioxide

Atmospheric NO_2 is formed primarily from reactions between nitric oxide (NO) and oxygen or ozone. NO is formed during high temperature combustion processes, when the nitrogen and oxygen in the combustion air combine. Although NO is much less harmful than NO_2, it can be converted to NO_2 in the atmosphere within a matter of hours, or even minutes, under certain conditions. For purposes of state and federal air quality planning, the San Joaquin Valley Air Basin is in attainment for NO_2.

Table 8.1-3 shows the maximum one-hour and annual average NO_2 levels recorded in Fresno between 1991 and 2000. During the period shown, there has not been a single violation of either the state one-hour standard or the NAAQS (0.053 ppm, annual average). Figure 8.1-8 shows the trend of maximum one-hour NO_2 levels at these two sites from 1991 through 2000. These levels remain below half the state standard of 0.25 ppm.

TABLE 8.1-3
Nitrogen Dioxide Levels In Fresno, 1991-2000 (ppm)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highest 1-Hour Average	0.120	0.100	0.120	0.119	0.104	0.093	0.092	0.112	0.103	0.094
Annual Average (NAAQS = 0.053 ppm)	0.023	0.020	0.023	0.022	0.022	0.021	0.021	0.020	0.023	0.020
Number of Days Exceeding										
State Standard (0.25 ppm, 1-hour)	0	0	0	0	0	0	0	0	0	0

Sources: California Air Quality Data, California Air Resources Board website; USEPA AIRS website.

8.1.3.3 Carbon Monoxide

CO is a product of incomplete combustion, principally from automobiles and other mobile sources of pollution. In many areas of California, CO emissions from wood-burning stoves and fireplaces can also be measurable contributors to high ambient levels of CO. Industrial sources typically contribute less than 10 percent of ambient CO levels. Peak CO levels occur typically during winter months, due to a combination of higher emission rates and stagnant weather conditions. For purposes of air quality planning, Fresno County, outside the Fresno urbanized area, is classified as being in attainment of both national and state ambient standards for carbon monoxide.

Table 8.1-4 shows the California and federal air quality standards for CO, and the maximum one- and eight-hour average levels recorded in Fresno during the period 1991-2000. Trends of maximum eight-hour and one-hour average CO levels are shown in Figures 8.1-9 and 8.1-10, respectively, which show that maximum ambient CO levels at Fresno have been below the state standards for many years, and continue to gradually decline.

TABLE 8.1-4
Carbon Monoxide Levels In Fresno, 1991-2000 (ppm)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highest 8-hour average	10.38	7.63	6.88	8.10	7.28	6.83	5.69	5.88	5.53	5.24
Highest 1-hour average	14	19	17	15	10	14	12	9	9	8
Number of Days Exceeding										
State Standard (9 ppm, 8-hr)	0	0	0	0	0	0	0	0	0	0
State Standard (20 ppm, 1-hr)	0	0	0	0	0	0	0	0	0	0
Federal Standard (9 ppm, 8-hr)	0	0	0	0	0	0	0	0	0	0
Federal Standard (35 ppm, 1-hr)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, California Air Resources Board website; USEPA AIRS website.

8.1.3.4 Sulfur Dioxide

SO_2 is produced when any sulfur-containing fuel is burned. It is also emitted by chemical plants that treat or refine sulfur or sulfur-containing chemicals. Natural gas contains negligible sulfur, while fuel oils contain much larger amounts. Because of the complexity of the chemical reactions that convert

SO_2 to other compounds (such as sulfates), peak concentrations of SO_2 occur at different times of the year in different parts of California, depending on local fuel characteristics, weather, and topography. The San Joaquin Valley Air Basin is considered to be in attainment for SO_2 for purposes of state and federal air quality planning.

Table 8.1-5 presents the state air quality standard for SO_2 and the maximum levels recorded in Fresno (from 1991 through 1997, when monitoring of this pollutants ceased there) and in Bakersfield (California Avenue monitoring station) during 1999 and 2000. (Note that no SO_2 readings were recorded at this site during 1998.) The federal annual average standard is 0.03 ppm; during the period shown, the annual average SO_2 levels at both sites have been well under the federal standard. The state 24-hour average standard is 0.04 ppm, which has not been exceeded in either Fresno or Bakersfield for many years. Figure 8.1-11 shows that for most of the past ten years, maximum one-hour SO_2 levels have typically been about one-tenth of the state standard.

TABLE 8.1-5
Sulfur Dioxide Levels In Fresno, 1991-1997, and Bakersfield, 1999-2000 (ppm)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highest 1-Hour Average	0.03	0.03	0.01	0.02	0.01	0.02	0.01	--	0.01	0.02
Highest 24-Hour Average	0.013	0.010	0.010	0.007	0.011	0.009	0.003	--	0.006	0.011
Annual Average, All Hours	0.004	0.002	0.002	0.004	0.004	0.002	0.000	--	0.003	0.003
Number of Days Exceeding										
State Standard (0.25 ppm, 1-hr)	0	0	0	0	0	0	0	0	0	0
State Standard (0.04 ppm, 24-hour)	0	0	0	0	0	0	0	0	0	0
Federal Standard (0.5ppm, 3-hour)	0	0	0	0	0	0	0	0	0	0
Federal Standard (0.14ppm, 24-hours)	0	0	0	0	0	0	0	0	0	0

Sources: California Air Quality Data, California Air Resources Board; USEPA AIRS website.

8.1.3.5 Particulate Sulfates

Particulate sulfates are the product of further oxidation of SO_2. The San Joaquin Valley Air Basin is in attainment of the state standard for sulfates. There is no federal standard for sulfates.

Table 8.1-6 shows the California air quality standard for particulate sulfate and the maximum 24-hour average levels recorded in Bakersfield (the closest sulfate-monitoring site) from 1990 through 1997, the last year for which sulfate data are available. The trend of maximum 24-hour average sulfates over this period is plotted in Figure 8.1-12. Over the period shown, maximum levels generally declined to about 20 percent-30 percent of the state standard.

TABLE 8.1-6
Particulate Sulfate Levels in Bakersfield, 1990-1997 ($\mu g/m^3$)

	1990	1991	1992	1993	1994	1995	1996	1997
Maximum 24-hour Average	11.9	9.7	9.2	9.5	15.0	7.5	7.4	5.6
Number of Days Exceeding								
State Standard (25 $\mu g/m^3$, 24-hour)	0	0	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board.

8.1.3.1 Fine Particulates (PM_{10} and $PM_{2.5}$)

Particulates in the air are caused by a combination of wind-blown fugitive dust; particles emitted from combustion sources (usually carbon particles); and organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, sulfur oxides, and nitrogen oxides. In 1984, the ARB adopted standards for fine particulates (PM_{10}), and phased out the total suspended particulate (TSP) standards that had previously been in effect. PM_{10} standards were substituted for TSP standards because PM_{10} corresponds to the size range of inhalable particulates related to human health. In 1987, USEPA also replaced national TSP standards with PM_{10} standards. For air quality planning purposes, the San Joaquin Valley Air Basin is considered to be in nonattainment of both federal and state PM_{10} standards.

As discussed in Section 8.1.2 above, USEPA issued new standards having an effective date of September 16, 1997, but these were remanded by a federal appeals court.

Table 8.1-7 shows the federal and state air quality standards for PM_{10}, maximum levels recorded at monitoring stations in Fresno during 1991-2000, and geometric and arithmetic annual averages for the same period.[1] In Fresno, the maximum 24-hour PM_{10} levels continue to exceed the state standard many times per year, but the federal 24-hour standard has not been exceeded since 1990. Annual average PM_{10} levels remain generally above the state standard. The annual average federal standard has been met since 1992.

The trend of maximum 24-hour average PM_{10} levels is plotted in Figure 8.1-13, and the trend of expected violations of the state 24-hour standard of 50 $\mu g/m^3$ is plotted in Figure 8.1-14. Note that since PM_{10} is measured only once every six days, <u>expected</u> violation days are six times the number of <u>measured</u> violations.

$PM_{2.5}$ data are available from the Fresno monitoring station for 1991-2000. Table 8.1-8 presents the maximum 24-hour average concentration and annual arithmetic mean reported by ARB, and the three-year average levels of those readings (on which compliance with USEPA's proposed ambient standards will be based). Historical trends of the maximum and 98th percentile 24-hour average concentrations are shown in Figure 8.1-15. The data from the Fresno monitor indicate that 98th percentile 24-hour average $PM_{2.5}$ concentration levels have been declining and appear to be well under the proposed standard of 65 $\mu g/m^3$. The 3-year average of annual arithmetic means declined during the 1990s, but remains about 20 percent higher than the proposed NAAQS for this pollutant (15 $\mu g/m^3$). As discussed earlier, the new $PM_{2.5}$ standard will not be in effect until the lawsuit filed against USEPA is settled.

TABLE 8.1-7
PM_{10} Levels in Fresno, 1991-2000 ($\mu g/m^3$)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highest 24-Hour Average	147	120	129	125	122	144	124	141	154	138
Annual Geometric Mean (State Standard = 30 $\mu g/m^3$)	47.7	44.0	37.5	33.8	37.9	33.0	37.1	27.1	35.8	29.5
Annual Arithmetic Mean (Federal Standard = 50 $\mu g/m^3$)	60.0	48.8	46.7	39.0	44.5	37.0	42.6	33.7	44.6	34.8

1 The geometric mean is the nth root of the product of n observations. The arithmetic annual average is simply the mean of all observations.

TABLE 8.1-7
PM_{10} Levels in Fresno, 1991-2000 (µg/m³)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Number of Days Exceeding[a]										
State Standard (50 µg/m³, 24-hour)	29	19	22	8	26	11	12	10	19	4
Federal Standard (150 µg/m³, 24-hour)	0	0	0	0	0	0	0	0	0	0
Maximum Expected Violation Days[a,b]										
State Standard (50 µg/m³, 24-hour)	174	114	132	48	136	57	72	60	114	24
Federal Standard (150 µg/m³, 24-hour)	0	0	0	0	0	0	0	0	0	0

Source: California Air Quality Data, Annual Summary, California Air Resources Board.
[a] Based on readings every six days.
[b] Based on multiplying exceedance readings by a factor of six due to readings taken only once per six days. The actual number of violation days is expected to be less since some of the days readings not taken will be within the standards.

TABLE 8.1-8
$PM_{2.5}$ Levels in Fresno, 1991-2000 (g/m³)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highest 24-Hour Average	92	71	92	80	65	56	105	88	45	160
98th Percentile 24-Hour Average Concentration	91.9	68.0	74.0	68.0	61.0	41.0	65.0	52.0	45.0	89.0
Three-Year Average – 98th Percentile of 24-Hour Average Concentrations (Federal Standard = 65µg/m³)[a]	101	79	78	70	68	57	56	53	54	62
Annual Arithmetic Mean	25.9	21.6	21.5	23.2	18.0	15.9	18.7	19.2	18.6	15.4
Three-Year Average of Annual Arithmetic Mean (Federal Standard = 15µg/m³)[a]	15.7	22.9	23.0	22.1	20.9	19.0	17.5	17.9	18.8	17.7

Source: California Air Quality Data, California Air Resources Board website.
The $PM_{2.5}$ data are derived from the dichotomous sampler and not from a Federal Reference Method $PM_{2.5}$ sampler. ARB indicates that this information should not be used for a regulatory comparison to the national $PM_{2.5}$ standards.
[a] 1989 data for three-year average from Olive Street monitoring station.

8.1.3.2 Airborne Lead

The majority of lead in the air results from the combustion of fuels that contain lead. Until 25 years ago, motor gasolines contained relatively large amounts of lead compounds used as octane-rating improvers, with the result that ambient lead levels were relatively high. Beginning with the 1975 model year, however, manufacturers began to equip new automobiles with exhaust catalysts, which are poisoned by the exhaust products of leaded gasoline. Thus, unleaded gasoline became the required fuel for an increasing fraction of new vehicles, and the phaseout of leaded gasoline began. As a result, ambient lead levels decreased dramatically, and for several years California air basins, including the San Joaquin Valley Air Basin, have been in attainment of state and federal airborne lead standards for air quality planning purposes. Table 8.1-9 lists the state air quality standard for airborne lead and the levels recorded in the Central Valley between 1991 and 2000. ARB has reported monthly and quarterly lead measurements in Sacramento between 1991 and 1997; USEPA reports quarterly lead data in its AIRS database for Fresno station between 1995 and 2000.[2] The trend of airborne lead levels from 1991 through 2000 is plotted in Figure 8.1-16, which shows the continued decline in concentrations.

TABLE 8.1-9
Airborne Lead Levels in the Central Valley, 1991-2000 (μg/m³)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highest Monthly Average (Sacramento)	0.06	0.03	0.02	0.03	0.06	0.02	0.02	--	--	--
Highest Quarterly Average										
Sacramento	0.04	0.02	0.01	0.02	0.02	0.01	0.01	--	--	--
Fresno	--	--	--	--	0.02	0.01	0.01	0.01	0.01	0.01

Source: California Air Quality Data, California Air Resources Board; USEPA AIRS website.

8.1.4 Affected Environment

The USEPA has responsibility for enforcing, on a national basis, the requirements of many of the country's environmental and hazardous waste laws. California is under the jurisdiction of USEPA Region IX, which has its offices in San Francisco. Region IX is responsible for the local administration of USEPA programs for California, Arizona, Nevada, Hawaii, and certain Pacific trust territories. USEPA's activities relative to the California air pollution control program focus principally on reviewing California's submittals for the State Implementation Plan (SIP). The SIP is required by the federal Clean Air Act to demonstrate how all areas of the state will meet the national ambient air quality standards within the federally specified deadlines (42 USC §7409, 7411).

The California Air Resources Board was created in 1968 by the Mulford-Carrell Air Resources Act, through the merger of two other state agencies. ARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update as necessary the state's ambient air quality standards; to review the operations of the local air pollution control districts; and to review and coordinate preparation of the SIP for achievement of the federal ambient air quality standards (California Health & Safety Code (H&SC) §39500 et seq.).

When the state's air pollution statutes were reorganized in the mid-1960s, local air pollution control districts (APCDs) were required to be established in each county of the state (H&SC §4000 et seq.). There are three different types of districts: county, regional, and unified. In addition, special air quality management districts (AQMDs), with more comprehensive authority over non-vehicular sources as well as transportation and other regional planning responsibilities, have been established by the Legislature for several regions in California (H&SC §40200 et seq.).

2 EPA does not report monthly average readings because the federal standard is on a quarterly basis. The NAAQS for lead is numerically the same as the state standard (1.5 μg/m³), but because the averaging period is quarterly, not monthly, the NAAQS is less stringent.

Air pollution control districts and air quality management districts in California have principal responsibility for:

- Developing plans for meeting the state and federal ambient air quality standard
- Developing control measures for non-vehicular sources of air pollution necessary to achieve and maintain both state and federal air quality standards
- Implementing permit programs established for the construction, modification, and operation of sources of air pollution
- Enforcing air pollution statutes and regulations governing non-vehicular sources, and for developing employer-based trip reduction programs

Each level of government has adopted specific regulations that limit emissions from stationary combustion sources, several of which are applicable to this project. The other agencies having permitting authority for this project are shown in Table 8.1-10. The applicable federal laws, ordinances, regulations and standards (LORS) and compliance with these requirements are discussed in more detail in the following sections. Applications for a Determination of Compliance and a Prevention of Significant Deterioration Permit will be filed with the SJVUAPCD and the USEPA, respectively, at approximately the same time as the Application for Certification (AFC) is filed with the Commission.

TABLE 8.1-10
Air Quality Agencies

Agency	Authority	Contact
USEPA Region IX	PSD permit issuance, enforcement	Gerardo Rios, Chief, Permits Office USEPA Region IX 75 Hawthorne Street San Francisco, CA 94105 (415) 744-1259
California Air Resources Board	Regulatory oversight	Mike Tollstrup, Chief Project Assessment Branch California Air Resources Board 2020 L Street Sacramento, CA 95814 (916) 322-6026
San Joaquin Valley Unified APCD	Permit issuance, enforcement	Seyed Sadredin Director of Permit Services 1990 E. Gettysburg Avenue Fresno, CA 93726-0244 (559) 230-6000

8.1.4.1 Laws, Ordinances, Regulations, and Standards

8.1.4.1.1 Federal

The USEPA implements and enforces the requirements of many of the federal environmental laws. USEPA Region IX, which has its offices in San Francisco, administers federal air programs in California. The federal Clean Air Act, as most recently amended in 1990, provides USEPA with the legal authority to regulate air pollution from stationary sources such as the CVEC facility. USEPA has promulgated the following stationary source regulatory programs to implement the requirements of the 1990 Clean Air Act:

- Standards of Performance for New Stationary Sources (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAPS)
- Prevention of Significant Deterioration (PSD)
- New Source Review (NSR)
- Title IV: Acid Deposition Control
- Title V: Operating Permits

National Standards of Performance for New Stationary Sources

Authority. Clean Air Act §111, 42 USC §7411; 40 CFR Part 60, Subparts GG and Da

Purpose. Establishes standards of performance to limit the emission of criteria pollutants (air pollutants for which USEPA has established national ambient air quality standards (NAAQS)) from new or modified facilities in specific source categories. The applicability of these regulations depends on the equipment size; process rate; and/or the date of construction, modification, or reconstruction of the affected facility. Only the Standards of Performance for Stationary Gas Turbines, which limit NO_x and SO_2 emissions from turbines, and the Standards of Performance for Electric Utility Steam Generating Units, which limit NO_x, SO_2, and particulate emissions from the HRSGs, are applicable to the project. These standards are implemented at the local level with federal and state oversight.

Administering Agency. San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD), with USEPA Region IX and California Air Resources Board (CARB) oversight.

National Emission Standards for Hazardous Air Pollutants

Authority. Clean Air Act § 112, 42 USC §7412; 40 CFR Part 63

Purpose. Establishes national emission standards to limit emissions of hazardous air pollutants (HAPs, or air pollutants identified by USEPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established) from facilities in specific source categories. Requires the use of maximum achievable control technology (MACT) for major sources of HAPs that are not specifically regulated or exempted under Part 63. Standards are implemented at the local level with federal oversight. NESHAPS promulgated pursuant to Section 112 of the Clean Air Act are not applicable to the project because no specific standards have been established and the facility is not a major source of HAPs; thus NESHAPs requirements will not be addressed further.

Prevention of Significant Deterioration Program

Authority. Clean Air Act §160-169A, 42 USC §7470-7491; 40 CFR Parts 51 and 52

Purpose. Requires pre-construction review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. Prevention of Significant Deterioration (PSD) applies to pollutants for which ambient concentrations do not exceed the corresponding NAAQS (i.e., attainment pollutants). The PSD program allows new sources of air pollution to be constructed, or existing sources to be modified, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I areas (e.g., national parks and wilderness areas).

Administering Agency. USEPA, Region IX.

New Source Review

Authority. Clean Air Act §171-193, 42 USC §7501 et seq.; 40 CFR Parts 51 and 52

Purpose. Requires pre-construction review and permitting of new or modified major stationary sources of air pollution to allow industrial growth without interfering with the attainment and maintenance of ambient quality standards. This program is implemented at the local level with USEPA oversight.

Administering Agency. SJVUAPCD, with USEPA Region IX oversight.

Title IV - Acid Rain Program

Authority: Clean Air Act §401, 42 USC §7651 et seq.; 40 CFR Part 72

Purpose. Requires the reduction of emissions of acidic compounds and their precursors. The principal source of these compounds is the combustion of fossil fuels. Therefore, Title IV established national standards to limit SO_2 and NO_x emissions from electrical power generating facilities. These standards are implemented at the local level with federal oversight.

Administering Agency. SJVUAPCD, with USEPA Region IX oversight.

Title V - Operating Permits Program

Authority. Clean Air Act § 501 (Title V), 42 USC §7661; 40 CFR Part 70

Purpose. Requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. Title V applies to major facilities, Phase II acid rain facilities, subject solid waste incinerator facilities, and any facility listed by USEPA as requiring a Title V permit. These requirements are implemented at the local level with federal oversight.

Administering Agency. SJVUAPCD, with USEPA Region IX oversight.

8.1.4.1.2 State

The California Air Resources Board (CARB) was created in 1968 by the Mulford-Carrell Air Resources Act, through the merger of two other state agencies. CARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update, as necessary, the state's ambient air quality standards; to review the operations of the local air pollution control districts; and to review and coordinate preparation of the State Implementation Plan (SIP) for achievement of the federal ambient air quality standards.

State Implementation Plan

Authority. Health & Safety Code (H&SC) §39500 et seq.

Purpose. Required by the federal Clean Air Act, the SIP must demonstrate the means by which all areas of the state will attain and maintain NAAQS within the federally mandated deadlines. CARB reviews and coordinates preparation of the SIP. Local districts must adopt new rules (and/or revise existing rules) and demonstrate that the resulting emission reductions, in conjunction with reductions in mobile source emissions, will result in the attainment of NAAQS. The relevant SJVUAPCD Rules and Regulations that have also been incorporated into the SIP are discussed with the local LORS.

Administering Agency. SJVUAPCD, with CARB and USEPA Region IX oversight.

California Clean Air Act
Authority. H&SC §40910 - 40930

Purpose. Established in 1989, the California Clean Air Act requires local districts to attain and maintain both national and state ambient air quality standards at the "earliest practicable date." Local districts must prepare air quality plans demonstrating the means by which the ambient air quality standards will be attained and maintained. The SJVUAPCD Air Quality Plan is discussed with the local LORS.

Administering Agency. SJVUAPCD, with CARB oversight.

Toxic Air Contaminant Program
Authority. H&SC §39650 - 39675

Purpose. Established in 1983, the Toxic Air Contaminant Identification and Control Act created a two-step process to identify toxic air contaminants and control their emissions. CARB identifies and prioritizes the pollutants to be considered for identification as toxic air contaminants. CARB assesses the potential for human exposure to a substance, while the Office of Environmental Health Hazard Assessment evaluates the corresponding health effects. Both agencies collaborate in the preparation of a risk assessment report, which concludes whether a substance poses a significant health risk and should be identified as a toxic air contaminant. In 1993, the Legislature amended the program to identify the 189 federal hazardous air pollutants as toxic air contaminants. CARB reviews the emission sources of an identified toxic air contaminant and, if necessary, develops air toxics control measures to reduce the emissions. There have been no measures adopted via the Toxic Air Contaminant Program that are applicable to the project.

Air Toxic "Hot Spots" Act
Authority. CA Health & Safety Code § 44300-44384; 17 CCR §93300-93347

Purpose. Established in 1987, the Air Toxics "Hot Spots" Information and Assessment Act supplements the toxic air contaminant program, by requiring the development of a statewide inventory of air toxics emissions from stationary sources. The program requires affected facilities to prepare (1) an emissions inventory plan that identifies relevant air toxics and sources of air toxics emissions; (2) an emissions inventory report quantifying air toxics emissions; and (3) a health risk assessment, if necessary, to characterize the health risks to the exposed public. Facilities whose air toxics emissions are deemed to pose a significant health risk must issue notices to the exposed population. In 1992, the Legislature amended the program to further require facilities whose air toxics emissions are deemed to pose a significant health risk to implement risk management plans to reduce the associated health risks. This program is implemented at the local level with state oversight.

Administering Agency. SJVUAPCD, with CARB oversight.

CEC and CARB Memorandum of Understanding
Authority. CA Pub. Res. Code § 25523(a); 20 CCR §1752, 1752.5, 2300-2309, and Div. 2, Chap. 5, Art. 1, Appendix B, Part (k)

Purpose. Establishes requirements in the CEC's decision-making process for an AFC that assures protection of environmental quality.

Administering Agency. California Energy Commission.

8.1.4.1.3 Local

When the state's air pollution statutes were reorganized in the mid-1960s, local districts were required to be established in each county of the state. There are three different types of districts: county, regional, and unified (including the SJVUAPCD). Local districts have principal responsibility for developing plans for meeting the NAAQS and California ambient air quality standards; for developing control measures for non-vehicular sources of air pollution necessary to achieve and maintain both state and federal air quality standards; for implementing permit programs established for the construction, modification, and operation of sources of air pollution; for enforcing air pollution statutes and regulations governing non-vehicular sources; and for developing programs to reduce emissions from indirect sources.

San Joaquin Valley Unified Air Pollution Control District Attainment Demonstration Plans

Authority. H&SC §40914

Purpose. The SJVUAPCD plans define the proposed strategies, including stationary source and transportation control measures and new source review rules, that will be implemented to attain and maintain the state ambient air quality standards. The relevant stationary source control measures and new source review requirements are discussed with SJVUAPCD Rules and Regulations.

Administering Agency. SJVUAPCD, with CARB oversight.

San Joaquin Valley Unified Air Pollution Control District Rules and Regulations

Authority. H&SC §4000 et seq., H&SC §40200 et seq., indicated SJVUAPCD Rules

Purpose. Establishes procedures and standards for issuing permits; establishes standards and limitations on a source-specific basis.

Administering Agency: SJVUAPCD with USEPA and CARB oversight.

8.1.4.4 Summary of Applicable Requirements

This section summarizes applicable federal, state and local air pollution requirements

8.1.4.4.1 Authority to Construct

Rule 2010 (Permits Required) specifies that any facility installing nonexempt equipment that causes or controls the emission of air pollutants must first obtain an Authority to Construct from the SJVUAPCD. Under Section 5.2.9 of Rule 2201 (New and Modified Stationary Source Review Rule), the District's Final Determination of Compliance acts as an authority to construct for a power plant upon approval of the project by the CEC.

8.1.4.4.2 Review of New or Modified Sources

Rule 2201 (New and Modified Stationary Source Review Rule) implements the federal NSR program, as well as the new source review requirements of the California Clean Air Act. The rule contains the following elements:

- Best available control technology (BACT)
- Emission offsets
- Air quality impact analysis (AQIA)

Best Available Control Technology

Best Available Control Technology (BACT) must be applied to any new or modified source resulting in an emissions increase exceeding any SJVUAPCD BACT threshold shown in Table 8.1-11.

TABLE 8.1-11
SJVUAPCD BACT Emission Thresholds

Pollutant	Threshold
PM	2 lb/day
NO_x	2 lb/day
SO_2	2 lb/day
VOC	2 lb/day
CO	100 tpy

The SJVUAPCD defines BACT as the most stringent emission limitation or control technique that:

- Has been achieved in practice for such emissions unit and class of source; or
- Is contained in any State Implementation Plan approved by the USEPA for such emissions unit category and class of source. A specific limitation or control technique shall not apply if the owner or operator of the proposed emissions unit demonstrates to the satisfaction of the APCO that such limitation or control technique is not presently achievable; or
- Is any other emission limitation or control technique, including process and equipment changes of basic and control equipment, found by the APCO to be technologically feasible for such class or category of sources or for a specific source, and cost-effective as determined by the APCO.

Emission Offsets

A new or modified facility with a stationary source NSR balance exceeding the SJVUAPCD offset thresholds shown in Table 8.1-12 must offset all emissions increases at a ratio that varies according to the distance between the facility and the source of the offsets.

TABLE 8.1-12
SJVUAPCD Offset Emission Thresholds

Pollutant	Threshold, lb/yr
NO_x	20,000
SO_2	54,730
CO[a]	200,000
VOC	20,000
PM	29,200

[a] In attainment areas. CO emissions in nonattainment areas subject to 30,000 lb/yr offset threshold.

Air Quality Impact Analysis

An air quality impact analysis must be conducted to evaluate impacts of emission increases from new or modified facilities on ambient air quality. Project emissions must not cause an exceedance of any ambient air quality standard.

Toxic Risk Management. The District's Risk Management Review Policy for Permitting New and Modified Sources provides a mechanism for evaluating potential impacts of air emissions of toxic substances from new, modified, and relocated sources in the SJVUAPCD. The rule requires a demonstration that the source will not adversely impact the health and welfare of the public.

CEC Review. Rule 2201, Section 5.2 establishes a procedure for coordinating SJVUAPCD review of power plant projects with the CEC AFC process. Under this rule, the SJVUAPCD reviews the AFC and issues a Determination of Compliance for a proposed project, which is equivalent to an Authority to Construct. A permit to operate is issued following the CEC's certification of a project and demonstration of compliance with all permit conditions.

8.1.4.4.3 Prevention of Significant Deterioration

The PSD requirements apply, on a pollutant-specific basis, to any project that is a new major stationary source or a major modification to an existing major stationary source. A major source is a listed facility (one of 28 PSD source categories listed in the federal Clean Air Act) that emits at least 100 tpy, or any facility that emits at least 250 tpy.

The PSD program contains the following elements:

- Air quality monitoring
- BACT
- Air quality impact analysis
- Protection of Class I areas
- Visibility, soils, and vegetation impacts

The project will result in emissions exceeding the applicable PSD thresholds, and, therefore, PSD does apply to this project. As the SJVUAPCD does not have delegation for the PSD program, a separate PSD application must be filed with the USEPA.

Air Quality Monitoring

At its discretion, USEPA may require pre-construction and/or post-construction ambient air quality monitoring for PSD sources. Pre-construction monitoring data must be gathered over a one-year period to characterize local ambient air quality. Post-construction air quality monitoring data must be collected as deemed necessary by USEPA to characterize the impacts of project emissions on ambient air quality.

Best Available Control Technology

BACT must be applied to any modified major source to minimize the emissions of those pollutants exceeding the PSD emission thresholds. USEPA defines BACT as an emissions limitation based on the maximum degree of reduction for each subject pollutant, considering energy, environmental, and economic impacts, that is achievable through the application of available methods, systems, and techniques. BACT must be as stringent as any emission limit required by an applicable NSPS or NESHAP.

Air Quality Impact Analysis

An air quality dispersion analysis must be conducted to evaluate impacts of significant emission increases from new or modified facilities on ambient air quality. PSD source emissions must not cause an exceedance of any ambient air quality standards, and the increase in ambient air concentrations must not exceed the allowable increments shown in Table 8.1-13.

TABLE 8.1-13
PSD Class II Increments[a]

Pollutant	Averaging Period	Allowable Increment (µg/m3)
NO_x	Annual	25
SO_2	Annual	20
	24-Hour	91
	3-Hour	512

[a] The SJVUAPCD has been designated nonattainment for PM_{10}. Therefore, PSD requirements are not applicable for PM_{10}.

Protection of Class I Areas

The increase in ambient air quality concentrations for the relevant pollutants (i.e., NO_x or SO_2) within Class I locations must be characterized if there is a significant emission increase associated with the new or modified PSD source.

Visibility, Soils, and Vegetation Impacts

Impairment to visibility, soils, and vegetation resulting from PSD source emissions as well as associated commercial, residential, industrial, and other growth must be analyzed. Cumulative impacts to local ambient air quality must also be analyzed.

8.1.4.4.4 Acid Rain Permit

Rule 2540 (Acid Rain Program) requires that certain subject facilities comply with maximum operating emissions levels for SO_2 and NO_x, and must monitor SO_2, NO_x, and CO_2 emissions and exhaust gas flow rates. A Phase II acid rain facility, such as CVEC, must obtain an acid rain permit as mandated by Title IV of the 1990 Clean Air Act Amendments. A permit application must be submitted to the SJVUAPCD at least 24 months before operation of the new unit commences. The application must present all relevant Phase II sources at the facility, a compliance plan for each unit, applicable standards, and an estimated commencement date of operations.

8.1.4.4.5 Federal Operating Permit

Rule 2520 (Federally Mandated Operating Permits) requires major facilities and Phase II acid rain facilities undergoing modifications to obtain an operating permit containing the federally enforceable requirements mandated by Title V of the 1990 Clean Air Act Amendments. A permit amendment application for a modification to an existing Title V facility must be submitted and an amended permit issued by the SJVUAPCD prior to commencing operations at the facility. The application must present a process description, all new stationary sources at the facility, applicable regulations, estimated emissions, associated operating conditions, alternative operating scenarios, a facility compliance plan, and a compliance certification.

8.1.4.4.6 New Source Performance Standards

Rule 4001 (New Source Performance Standards) requires compliance with applicable federal standards of performance for new or modified stationary sources.

Subpart GG (Standards of Performance for Stationary Gas Turbines) applies to gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (Gj/hr) (10.15 MMBtu/hr) at higher heating value. The proposed new turbines have an hourly heat input that exceeds this threshold. The NSPS NO_x emission limit is defined by the following equation:

$$STD = \frac{0.0150\ (14.4)}{Y} + F$$

where:

STD	=	allowable NO_x emissions (percent volume at 15 percent O_2 on a dry basis)
Y	=	manufacturer's rated heat rate at peak load (kilojoules per watt hour)
F	=	NO_x emission allowance for fuel-bound nitrogen (assumed to be zero for natural gas)

Subpart Da (Standards of Performance for Electric Utility Steam Generating Units) applies to steam generating units that are capable of combusting more than 250 MMBtu per hour of fossil fuel. The maximum duct burner heat input of 746 MMBtu per hour exceeds this threshold. Subpart Da contains emissions standards for particulate matter, SO_2, and NO_x.

8.1.4.4.7 SJVUAPCD Prohibitory Rules

The general prohibitory rules of the SJVUAPCD applicable to the project include the following:

- Rule 4101 – Visible Emissions: Prohibits visible emissions as dark or darker than Ringelmann No. 2 for periods greater than three minutes in any hour.
- Rule 4102 – Nuisance: Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage business or property.
- Rule 4201 – Particulate Matter Emission Standards: Prohibits PM emissions in excess of 0.1 grains per dry standard cubic foot (gr/dscf).
- Rule 4703 – Stationary Gas Turbines: Limits NO_x and CO emissions from stationary gas turbines to 9 ppm (@15 percent O_2, corrected for efficiency) and 25 ppm, respectively.
- Rule 4801 – Sulfur Compounds: Prohibits sulfur compound emissions, calculated as SO_2, in excess of 0.2 percent (2,000 ppm) from any source.
- Rule 8010 – Fugitive Dust Administrative Requirements for Control of PM_{10}: Sets forth definitions, applicability and administrative requirements for anthropogenic sources of PM_{10}.
- Rule 8020 – Fugitive Dust Requirements for Control of PM_{10} from Construction, Demolition, Excavation and Extraction Activities: Limits fugitive dust emissions from construction, demolition, excavation and related activities.

All applicable LORS are summarized in Table 8.1-14.

TABLE 8.1-14
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Sections)
Federal					
Clean Air Act (CAA) §160-169A and implementing regulations, Title 42 United States Code (USC) §7470-7491 (42 USC §7470-7491), Title 40 Code of Federal Regulations (CFR) Parts 51 & 52 (Prevention of Significant Deterioration Program)	Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies to pollutants for which ambient concentrations are lower than NAAQS.	USEPA	Issues Prevention of Significant Deterioration Permit for a Major Modification to an Existing Major Source.	Permit to be obtained before start of construction.	8.1.2.4, 8.1.4.3
CAA §171-193, 42 USC §7501 et seq. (New Source Review)	Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than NAAQS.	SJVUAPCD with USEPA oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3
CAA §401 (Title IV), 42 USC §7651 (Acid Rain Program)	Requires reductions in NO_x and SO_2 emissions.	SJVUAPCD with USEPA oversight	Issues Acid Rain monitoring plan error report after review of application.	Meet compliance deadlines listed in regulations; no permit issued.	8.1.2.4, 8.1.4.3
CAA §501 (Title V), 42 USC §7661 (Federal Operating Permits Program)	Establishes comprehensive permit program for major stationary sources.	SJVUAPCD with USEPA oversight	Issues Title V permit after review of application.	Permit to be obtained prior to commence-ment of construction.	8.1.2.4, 8.1.4.3
CAA §111, 42 USC §7411, 40 CFR Part 60 (New Source Performance Standards – NSPS)	Establishes national standards of performance for new stationary sources.	SJVUAPCD with USEPA oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3
State					
H&SC §44300-44384; California Code of Regulations (CCR) §93300-93347 (Toxic "Hot Spots" Act)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments.	SJVUAPCD with CARB oversight	After project review, issues DOC with conditions limiting emissions.	Screening HRA submitted as part of AFC.	8.1.2.4

TABLE 8.1-14
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Sections)
California Public Resources Code §25523(a); 20 CCR §§1752, 2300-2309 (CEC & CARB Memorandum of Understanding)	Requires that CEC's decision on AFC include requirements to assure protection of environmental quality; AFC required to address air quality protection.	CEC	After project review, issues Final Certification with conditions limiting emissions.	SJVUAPCD approval of AFC, i.e., DOC, to be obtained prior to CEC approval.	8.1.2.4
Local					
SJVUPCD Rule 2201 (New and Modified Stationary Source Review)	NSR: Requires that pre-construction review be conducted for all proposed new or modified sources of air pollution, including BACT, emissions offsets, and air quality impact analysis.	SJVUAPCD with CARB oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3
SJVUAPCD Rule 2520 (Federally Mandated Operating Permits)	Implements operating permits requirements of CAA Title V.	SJVUAPCD with USEPA oversight	Issues Title V permit after review of application.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3
SJVUAPCD Rule 2540 (Acid Rain Program)	Implements acid rain regulations of CAA Title IV.	SJVUAPCD with USEPA oversight	Issues Title IV permit after review of application.	Application to be made within 12 months of start of facility operation.	8.1.2.4, 8.1.4.3
SJVUAPCD Rule 4101 (Visible Emissions)	Limits visible emissions to no darker than Ringelmann No. 2 for periods greater than 3 minutes in any hour.	SJVUAPCD with CARB oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained prior to commencement of operation.	8.1.2.4, 8.1.4.3
SJVUAPCD Rule 4102 (Public Nuisance)	Prohibits emissions in quantities that adversely affect public health, other businesses, or property.	SJVUAPCD with CARB oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3
SJVUAPCD Rule 4201 (Particulate Matter)	Limits PM emissions from stationary sources.	SJVUAPCD with CARB oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3

TABLE 8.1-14
Laws, Ordinances, Regulations, Standards (LORS), and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Permit or Approval	Schedule and Status of Permit	Conformance (Sections)
SJVUAPCD Rule 4801 (Sulfur Compounds Emissions)	Limits SO_2 emissions from stationary sources.	SJVUAPCD with CARB oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3
SJVUAPCD Rule 4703 (Stationary Gas Turbines)	Limits NO_x and CO emissions from gas turbines.	SJVUAPCD with CARB oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3
SJVUAPCD Rule 4001 (New Source Performance Standards: 40 CFR 60, Subpart GG, Stationary Gas Turbines; Subpart Da, Boilers)	Requires monitoring of fuel, other operating parameters; limits NO_x and SO_2 and PM emissions, requires source testing, emissions monitoring, and recordkeeping.	SJVUAPCD with CARB oversight	After project review, issues DOC with conditions limiting emissions.	Agency approval to be obtained before start of construction.	8.1.2.4, 8.1.4.3

8.1.5 Environmental Consequences

8.1.5.1 Overview of the Analytical Approach to Estimating Facility Impacts

The emissions sources at CVEC include three gas turbines with heat recovery steam generators and supplemental burners (duct burners), one steam turbine, an auxiliary boiler, and a cooling tower, plus minor auxiliary equipment (emergency generator and fire pump engine). The actual operation of the turbines will range between 70 percent and 100 percent of their maximum rated output. Supplemental firing will be provided by the duct burners as needed to maintain required electricity and steam production rates. Evaporative inlet air cooling and steam injection will be used to increase power output under certain conditions as well. The auxiliary boiler will be used to provide steam for auxiliary purposes. Emission control systems will be fully operational during all operations except startups and shutdowns. Maximum annual emissions are based on operation of the project at maximum firing rates and include the expected maximum number of startup periods that may occur in a year. Each turbine startup will result in transient emission rates until steady-state operation for the gas turbine and emission control systems is achieved.

Ambient air quality impact analyses for the site have been conducted to satisfy the USEPA, SJVUAPCD, and CEC requirements for criteria pollutants (NO_2, CO, PM_{10}, and SO_2), noncriteria pollutants, and construction impacts on a pollutant-specific basis. The following sections describe the emission sources that have been evaluated, the ambient impact analyses results, and the evaluation of facility compliance with the applicable air quality regulations, including SJVUAPCD Rules 2010 and 2201.

8.1.5.1.1 Facility Emissions

The proposed project will be a new source. As discussed in Section 2, the new equipment will consist of three Siemens-Westinghouse 501FD combustion turbines (or equivalent), rated at 180 MW (nominal at site design conditions); three heat recovery steam generators (HRSGs) equipped with duct burners rated at 746 MMBtu/hr (HHV, each); a 570-MW (nominal) condensing steam turbine; one 125,000 lb/hr auxiliary boiler; and a 16-cell cooling tower. Incidental equipment will include a 370 hp Diesel fire pump and a 1040 kW natural gas-fired emergency generator. Specifications for the turbines/HRSGs, the auxiliary boiler, the cooling tower, and the emergency equipment are provided in Appendix 8.1A, Tables 8.1A-1 through 8.1A-5. Natural gas will be the only fuel consumed during plant operation. There will be no distillate fuel oil firing at CVEC except in the fire pump engine. Typical specifications for the natural gas fuel are shown in Table 8.1-15.

Natural gas combustion results in the formation of NO_x, SO_2, unburned hydrocarbons (VOC), PM_{10}, and CO. Because natural gas is a clean burning fuel, there will be minimal formation of combustion PM_{10} and SO_2. The combustion turbines will be equipped with dry low-NOx combustors that minimize the formation of NO_x and CO. To further reduce NO_x emissions, selective catalytic reduction (SCR) and oxidation catalyst control systems will be utilized. The duct burners and auxiliary boiler will also be equipped with a low- NO_x burner design that minimizes NO_x formation.

Various other pollutants will also be emitted by the facility, including ammonia (NH_3), which is used as a reactant by the SCR systems to control NO_x. Emissions of all of the criteria and noncriteria pollutants have been characterized and quantified in this application.

TABLE 8.1-15
Nominal Fuel Properties – Natural Gas

Component Analysis		Chemical Analysis	
Component	**Average Concentration, Volume**	**Constituent**	**Percent by Weight**
CH_4	96.19 %	C	72.71%
C_2H_6	1.57%	H	23.77%
C_3H_8	0.23%	N	0.78%
C_4H_{10}	0.07%	O	2.74%
C_5H_{12}	0.01%	S	0.25 gr/100 scf
C_6H_{14}	0.02%		
N_2	0.47 %	Higher Heating Value	1014 Btu/scf 22,726 Btu/lb
CO_2	1.44 %		
S	<0.001%		

Criteria Pollutant Emissions

The gas turbine, duct burner, and auxiliary boiler emission rates have been estimated from vendor data, project design criteria, and established emission calculation procedures. The emission rates for the combustion turbines alone, the combustion turbines with duct burners and power augmentation, and the auxiliary boiler alone are shown in Tables 8.1-16, 8.1-17, and 8.1-18, respectively.

TABLE 8.1-16
Maximum Pollutant Emission Rates, Each Gas Turbine[a]

Pollutant	ppmvd @ 15% O_2	lb/MMBtu	lb/hr
NO_x	2.50[b,c]	0.0091	17.8
CO	6.00[b]	0.0132	26.0
VOC	1.4[b]	0.0018	3.5
PM_{10}[d]	-	0.0087	11.0
SO_2[e]	0.139	0.0007	1.4

[a] Emission rates shown reflect the highest value with no duct firing at any operating load. For NO_x, CO, and VOC, values exclude startups and shutdowns.
[b] Project design criteria.
[c] Average annual NO_x concentration will be 2.0 ppm.
[d] 100 percent of particulate matter emissions assumed to be emitted as PM_{10}; PM_{10} emissions include both front and back half as those terms are used in USEPA Method 5.
[e] Based on expected fuel sulfur content of 0.25 grains/100 scf.

TABLE 8.1-17
Maximum Pollutant Emission Rates, Each Turbine With Duct Firing

Pollutant	ppmvd @ 15% O_2	lb/MMBtu	lb/hr
NO_x	2.50[a,b]	0.0091	23.8
CO	6.00[a]	0.0132	34.7
VOC	2.00 [a]	0.0025	6.6
PM_{10}[c]	-	0.0062	16.4
SO_2[d]	0.139	0.0007	1.8

[a] Project design criteria.
[b] Average annual NO_x concentration will be 2.0 ppm.
[c] 100 percent of particulate matter emissions assumed to be emitted as PM_{10}; PM_{10} emissions include both front and back half as those terms are used in USEPA Method 5.
[d] Based on expected fuel sulfur content of 0.25 grains/100 scf.

TABLE 8.1-18
Maximum Pollutant Emission Rates Auxiliary Boiler[a]

Pollutant	ppmvd @ 3% O_2	lb/MMBtu	lb/hr
NO_x	9.0[b]	0.011	1.8
CO	50.0[b]	0.037	6.2
VOC	10.0[b]	0.0043	0.7
PM_{10}[c]	N/A	0.005	3.3
SO_2[d]	0.14[d]	0.0007	0.11

[a] Emission rates shown reflect the highest value at any operating load.
[b] Project specification.
[c] 100 percent of particulate matter emissions were assumed to be emitted as PM_{10}; PM_{10} emissions include both front and back half as those terms are used in USEPA Method 5.
[d] Based on expected fuel sulfur content of 0.25 grains/100 scf.

The maximum firing rates, daily and annual fuel consumption rates, and operating restrictions define the allowable operations that determine the maximum potential hourly, daily, and annual emissions for each pollutant. These allowable operations are typically referred to as “the operating envelope” for a facility. The maximum heat input rates (fuel consumption rates) for the gas turbines, duct burners, and auxiliary boiler are shown in Table 8.1-19.

TABLE 8.1-19
Maximum Facility Fuel Use (MMBTU)

Period	Auxiliary Boiler[a]	Gas Turbines and Duct Burners (each[b])	Total Fuel Use (all units)
Per Hour	161	2,623	8,030
Per Day	3,864	62,952[c]	192,720
Per Year	483,000	20,582,010[c]	62,229,030

[a] Based on 24 hours per day and 3000 hours of operation per year.
[b] Each of three trains.
[c] Based on 24 hours per day and 5100 hours per year of duct firing, per turbine.

Maximum emission rates expected to occur during a startup or shutdown are shown in Table 8.1-20. PM_{10} and SO_2 emissions have not been included in this table because emissions of these pollutants will be lower during a startup period than during baseload facility operation.

TABLE 8.1-20
Facility Startup/Shutdown Emission Rates[a]

	NO_x	CO	VOC
Startup/Shutdown, lb/hour	80[c]	902	16
Startup/Shutdown, lb/start[b]	240	2,706	48

[a] Estimated based on vendor data and source test data. See Appendix 8.1A, Table 8.1A-7a and 7b.
[b] Maximum of three hours per start.
[c] Maximum value of 240 lb/hr used in dispersion modeling analysis of startup impacts.

The analysis of maximum facility emissions was based on the turbine/HRSG and auxiliary boiler emission factors shown in Tables 8.1-16, 8.1-17, and 8.1-18; the startup emission rates shown in Table 8.1-20, and the ambient conditions that result in the highest emission rates. The maximum annual, daily, and hourly emissions for the project are shown in Table 8.1-21 and are based on the following operating cases:

Maximum Hourly Emissions:

- One turbine is in startup mode.
- Two turbines operate at full load with duct firing.
- Auxiliary boiler operates at full load.
- Either emergency generator or fire pump is being tested (unit with higher emissions is used for calculation: emergency generator for NO_x and CO; fire pump engine for SO_x).
- Cooling tower operates at maximum output.

Maximum Daily Emissions[3]:

For NO_x, CO, and VOC:

- Each turbine operates in startup or shutdown mode for 4 hours.
- Each turbine operates at full load with duct firing for 16 hours.
- Each turbine operates at full load without duct firing for the remaining 4 hours.
- Auxiliary boiler operates for 24 hours.
- Emergency generator and fire pump are tested.

For SO_2 and PM_{10}:

- Each turbine operates at full load with duct firing for 24 hours.
- Auxiliary boiler operates for 24 hours.
- Emergency generator and fire pump are tested.
- Cooling tower operates at maximum output.

[3] The maximum daily emissions scenarios are expected to seldom, if ever, occur. The Applicant expects that the turbines may rarely need to operate with duct firing for 24 hours per day; however, because of water supply constraints, power augmentation would only occur for 16 of the 24 hours. In addition, the purpose of the auxiliary boiler is to provide steam to keep the HRSGs hot when they are not in use; therefore on a day when the turbines and duct burners are in operation for 24 hours, the auxiliary boiler will not be needed. However, to simplify the analysis of emissions and modeled impacts, this extreme worst case was evaluated.

Maximum Annual Emissions:

For NO_x, CO, and VOC:

- Each turbine operates in startup or shutdown mode for 416 hours per year.
- Each turbine operates at full load with duct firing for 5,100 hours.
- Each turbine operates at full load without duct firing for the remaining 3,244 hours.
- Auxiliary boiler operates for 3000 hours per year.
- Emergency generator operates for 200 hours per year.
- Fire pump engine operates for 100 hours per year.

For SO_2 and PM_{10}:

- Each turbine operates at full load with duct burning for 5,100 hours per year.
- Each turbine operates at full load without duct firing for 3,660 hours per year.
- Auxiliary boiler operates for 3000 hours per year.
- Emergency generator operates for 200 hours per year.
- Fire pump engine operates for 100 hours per year.

Detailed emission calculations appear in Appendix 8.1A, Table 8.1A-9. Emissions from the cooling tower were calculated from the maximum cooling water TDS level (see Table 8.1A-3). Auxiliary boiler emissions characteristics are shown in Table 8.1A-2.

Noncriteria Pollutant Emissions

Noncriteria pollutants are compounds that have been identified as pollutants that pose a significant health hazard. Nine of these pollutants are regulated under the federal New Source Review program: lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds.[4] In addition to these nine compounds, the federal Clean Air Act lists 189 substances as potential hazardous air pollutants (Clean Air Act Sec. 112(b)(1)). The SJVUAPCD has also published a list of compounds it defines as potential toxic air contaminants (Toxics Policy, May 1991; Rule 2-1-316). Any pollutant that may be emitted from the project and is on the federal New Source Review list, the federal Clean Air Act list, and/or the District toxic air contaminant list has been evaluated as part of the AFC. Emission factors were determined by reviewing the available technical data, determining the products of combustion, and/or using material balance calculations.

Noncriteria pollutant emission factors for the analysis of emissions from the gas turbines were obtained from AP-42 (Table 3.1-3, 4/00, and Table 3.4-1 of the Background Document for Section 3.1), from the California Air Resources Board's CATEF database for gas turbines, and from source tests on a similar turbine. Specifically, factors for all pollutants except formaldehyde, hexane, propylene, and naphthalene and other PAHs were taken from AP-42.[5] AP-42 did not contain factors for hexane or propylene, and did not include speciated data for PAHs. Factors for these pollutants and for naphthalene were taken from the CATEF database (mean values). The emission factor for formaldehyde was taken from the results of a June 2000 source test on a dry low NO_x combustor-equipped large frame turbine (see summary of results in Appendix 8.1C). Noncriteria pollutant emission factors for the auxiliary boiler were taken from data compiled by the Ventura County APCD. Noncriteria pollutant emissions from the cooling tower were calculated from an analysis of cooling tower water supplies.

---

4 These pollutants are regulated under federal and state air quality programs; however, they are evaluated as noncriteria pollutants by the California Energy Commission.

5 Factors for acrolein and benzene reflect the use of an oxidation catalyst and were taken from Table 3.4-1 of the Background Document for Section 3.1.

TABLE 8.1-21
Emissions From New Equipment[a]

	NO_x	SO_2	CO	VOC	PM_{10}
Maximum Hourly Emissions, lb/hr					
Turbines and Duct Burners[b]	127.5	5.5	971.5	29.3	49.1
Auxiliary Boiler	1.8	0.11	6.2	0.7	3.3
Emergency Generator[c]	6.5	0.01	6.8	2.9	0.5
Fire Pump Engine[c]	3.3	0.10	2.0	0.4	0.14
Cooling Tower	-	-	-	-	1.1
Total Project, pounds per hour[d]	**135.8**	**5.7**	**984.4**	**32.9**	**53.9**
Maximum Daily Emissions, lb/day					
Turbines and Duct Burners[b]	2,315.0	132.3	12,227.8	552.0	1,177.2
Auxiliary Boiler	43.2	2.7	148.8	16.8	79.2
Emergency Generator	6.5	0.01	6.8	2.9	0.5
Fire Pump Engine	3.3	0.10	2.0	0.4	0.14
Cooling Tower	-	-	-	-	25.9
Total Project, pounds per day[d]	**2,367.9**	**135.1**	**12,385.3**	**572.1**	**1,282.9**
Maximum Annual Emissions, tpy					
Turbines and Duct Burners[b]	264.8	21.6	940.4	77.7	185.5
Auxiliary Boiler[d]	2.7	0.2	9.3	1.1	5.0
Emergency Generator	0.6	<0.1	0.7	0.3	0.1
Fire Pump Engine	0.2	<0.1	0.1	<0.1	<0.1
Cooling Tower	-	-	-	-	4.7
Total Project, tons per year[e]	**268.4**	**21.8**	**950.5**	**79.0**	**195.2**

[a] See Appendix 8.1A, Table 8.1A-9 for calculations.
[b] Includes startup emissions.
[c] Emergency generator (200 hrs/yr) and Diesel fire pump engine (100 hrs/yr) will not be tested during the same hour. Total hourly emissions reflect the higher of the two units' emissions.
[d] Auxiliary boiler will operate 3000 hours per year.
[e] Numbers may not add directly due to rounding.

The noncriteria pollutants that may be emitted from the project are shown in Table 8.1-22. Appendix 8.1A, Tables 8.1A-9a, 8.1A-9b, and 8.1A-9c provide the detailed emission calculations for noncriteria pollutants with the exception of ammonia, which is calculated from an ammonia slip level of 10 ppm. Although the turbines/HRSGs will be equipped with oxidation catalyst systems, only the acrolein and benzene emission factors reflect any control effectiveness. As discussed above, these factors are based on test data rather than any assumption regarding catalyst control efficiency. As emissions of each individual HAP are below 10 tons per year and total HAP emissions are below 25 tons per year, the turbines are not subject to the MACT requirements of 40 CFR Part 63.

TABLE 8.1-22
Noncriteria Pollutant Emissions For The Project

Pollutant	Emission Factor (lb/MMscf)	Emissions	
		lb/hr (each)	ton/yr (total, 3 turbines)
Gas Turbines (with Duct Burners)			
Ammonia	-[a]	35.2	414.2
Propylene	7.71×10^{-1}	1.98	23.5
HAPs			
Acetaldehyde	4.08×10^{-2}	0.10	1.2
Acrolein	3.69×10^{-3}	0.01	0.1
Benzene	3.33×10^{-3}	0.01	0.1
1,3-Butadiene	4.39×10^{-4}	1.1×10^{-3}	<0.1
Ethylbenzene	3.26×10^{-2}	0.08	1.0
Formaldehyde	1.65×10^{-1}	0.42	5.0
Hexane	2.59×10^{-1}	0.67	7.9
Naphthalene	1.33×10^{-3}	3.4×10^{-3}	<0.1
Polycyclic Aromatics	-- see Table 8.1A-9a for individual PAHs --		
Propylene Oxide	2.69×10^{-2}	0.08	0.9
Toluene	1.33×10^{-1}	0.34	4.0
Xylene	6.53×10^{-2}	0.17	2.0
Total HAPs (three turbines)			22.4
Auxiliary Boiler			
Ammonia	--	0.76	1.1
Propylene	1.55×10^{-2}	<0.1	<0.01
HAPs			
Acetaldehyde	9.0×10^{-4}	<0.01	<0.01
Acrolein	8.0×10^{-4}	<0.01	<0.01
Benzene	1.7×10^{-3}	<0.01	<0.01
Ethylbenzene	2.0×10^{-2}	<0.01	<0.01
Formaldehyde	3.6×10^{-3}	<0.01	<0.01
Hexane	1.3×10^{-3}	<0.01	<0.01
Naphthalene	3.0×10^{-4}	<0.01	<0.01
Polycyclic Aromatics	1.0×10^{-4}	<0.01	<0.01
Toluene	7.8×10^{-3}	<0.01	<0.01
Xylene	5.8×10^{-3}	<0.01	<0.01
Total HAPs			<0.01
Cooling Tower (emission factors in ppm; see text)			
Copper	0.032	<0.01	<0.01
Zinc	0.068	<0.01	<0.01
HAPs			
Arsenic	0.08	<0.01	<0.01
Cadmium	0	0	0
Chromium III	0	0	0
Lead	0.012	<0.01	<0.01
Mercury	0	0	0
Nickel	0.068	<0.01	<0.01
Total HAPs			<0.01

[a] Ammonia emissions calculated from 10 ppm ammonia slip rate. See Appendix 8.1A, Table 8.1A-1.

8.1.5.1.2 Air Quality Impact Analysis

Air Quality Modeling Methodology

An assessment of impacts from the project on ambient air quality has been conducted using USEPA-approved air quality dispersion models. These models are based on various mathematical descriptions of atmospheric diffusion and dispersion processes in which a pollutant source impact can be calculated over a given area.

The impact analysis was used to determine the worst-case ground-level impacts of the proposed project. The results were compared with established state and federal ambient air quality standards and PSD significance levels. If the standards are not exceeded under these worst-case conditions, then it is demonstrated that no exceedances are expected under any conditions. In accordance with the air quality impact analysis guidelines developed by USEPA (40 CFR Part 51, Appendix W: Guideline on Air Quality Models) and CARB (Reference Document for California Statewide Modeling Guideline, April 1989), the ground-level impact analysis includes the following assessments:

- Impacts in simple, intermediate, and complex terrain,
- Aerodynamic effects (downwash) due to nearby building(s) and structures, and
- Impacts from inversion breakup (fumigation).

Simple, intermediate, and complex terrain impacts were assessed for all meteorological conditions that would limit the amount of final plume rise. Plume impaction on elevated terrain, such as on the slope of a nearby hill, can cause high ground-level concentrations, especially under stable atmospheric conditions. Another dispersion condition that can cause high ground-level pollutant concentrations is caused by building downwash. Building downwash can occur when wind speeds are high and a building or structure is in close proximity to the emission stack. This can result in building wake effects where the plume is drawn down toward the ground by the lower pressure region that exists in the lee side (downwind) of the building or structure.

Fumigation conditions occur when the plume is emitted into a low lying layer of stable air (inversion) that then becomes unstable, resulting in a rapid mixing of pollutants towards the ground. The low mixing height that results from this condition allows little diffusion of the stack plume before it is carried downwind to the ground. Although fumigation conditions rarely last as long as an hour, relatively high ground-level concentrations may be reached during that period. Fumigation tends to occur under clear skies and light winds, and is more prevalent in the summer.

The basic model equation used in this analysis assumes that the concentrations of emissions within a plume can be characterized by a Gaussian distribution about the centerline of the plume. Concentrations at any location downwind of a point source such as a stack can be determined from the following equation:

$$C(x,y,z,H) = \left(\frac{Q}{2\pi\sigma_y\sigma_z u}\right) * \left(e^{-1/2(y/\sigma_y)^2}\right) * \left[\left\{e^{-1/2(z-H/\sigma_z)^2}\right\} + \left\{e^{-1/2(z+H/\sigma_z)^2}\right\}\right]$$

where

C	=	the concentration in the air of the substance or pollutant in question
Q	=	the pollutant emission rate
$\sigma_y\sigma_z$	=	the horizontal and vertical dispersion coefficients, respectively, at downwind distance x
u	=	the wind speed at the height of the plume center

x,y,z	=	the variables that define the 3-dimensional Cartesian coordinate system used; the downwind, crosswind, and vertical distances from the base of the stack
H	=	the height of the plume above the stack base (the sum of the height of the stack and the vertical distance that the plume rises due to the momentum and/or buoyancy of the plume)

Gaussian dispersion models are approved by USEPA for regulatory use and are based on conservative assumptions (i.e., the models tend to overpredict actual impacts by assuming steady-state conditions, no pollutant loss through conservation of mass, no chemical reactions, etc.). The USEPA models were used to determine if ambient air quality standards would be exceeded, and whether a more accurate and sophisticated modeling procedure would be warranted to make the impact determination. The following sections describe:

- Screening modeling procedures
- Refined air quality impact analysis
- Existing ambient pollutant concentrations and preconstruction monitoring
- Results of the ambient air quality modeling analyses
- PSD increment consumption

The screening and refined air quality impact analyses were performed using the Industrial Source Complex, Short-Term Model ISCST3 (Version 00101).[6] ISCST3 is a Gaussian dispersion model capable of assessing impacts from a variety of source types in areas of simple, intermediate, and complex terrain. The model can account for settling and dry deposition of particulates; area, line, and volume source types; downwash effects; and gradual plume rise as a function of downwind distance. The model is capable of estimating concentrations for a wide range of averaging times (from one hour to one year).

Inputs required by the ISCST3 model include the following:

- Model options
- Meteorological data
- Source data
- Receptor data

Model options refer to user selections that account for conditions specific to the area being modeled or to the emissions source that needs to be examined. Examples of model options include use of site-specific vertical profiles of wind speed and temperature; consideration of stack and building wake effects; and time-dependent exponential decay of pollutants. The model supplies recommended default options for the user. Except where explicitly stated, such as for building downwash, as described in more detail below, default values were used. A number of these default values are required for USEPA and local District approval of model results and are listed below.

- Rural dispersion coefficients
- Gradual plume rise
- Stack tip downwash
- Buoyancy induced dispersion
- Calm processing
- Default rural wind profile exponents = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55
- Default vertical temperature gradients = 0.02, 0.035
- 10 meter anemometer height

[6] In accordance with SJVUAPCD guidance, one-hour average NO2 concentrations were modeled using ISC_OLM (Version 96113). See discussion under “Specialized Modeling Analyses.”

ISCST3 uses hourly meteorological data to characterize plume dispersion. The representativeness of the data is dependent on the proximity of the meteorological monitoring site to the area under consideration; the complexity of the terrain, the exposure of the meteorological monitoring site, and the period of time during which the data are collected. The meteorological data used in this analysis were collected at Lemoore Naval Air Station, about 38 km southeast of the project site. Lemoore NAS is located on the valley floor, in a similar location relative to the coast and Sierra Nevada mountain ranges as the project site. Prevailing winds in both locations are up- and down-valley flows, with a minimal cross-valley component.

This five-year data set was approved by the SJVUAPCD staff as being representative of meteorological conditions at the project site and as meeting the requirements of the USEPA "On-Site Meteorological Program Guidance for Regulatory Model Applications" (EPA-450/4-87-013, August 1995).[7]

Meteorological data for the Lemoore NAS were obtained from the National Climatic Data Center. Morning and afternoon mixing heights utilized for these data were determined from interpolating quarterly mixing heights for the project area from the quarterly isopleths given in guidance (Holzworth, 1972).

The locations of the facility and the monitoring station are shown in Figure 8.1-17. The area in the vicinity of the project site and monitoring station is relatively flat.

The area surrounding the project site can be characterized, for dispersion purposes, as rural. Area within three kilometers of the project site includes mainly outlying orchards and farming areas, with some residential areas and industrial areas. In accordance with the Auer land use classification methodology (USEPA's "*Guideline on Air Quality Models*"), land use within the area circumscribed by a three km radius around the modified facility is greater than 50 percent rural. Therefore, in the modeling analyses supporting the permitting of the facility, rural dispersion coefficients have been assigned.

Representativeness has also been defined in the "*Workshop on the Representativeness of Meteorological Observations*" (Nappo et al., 1982) as "the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application." Judgments of representativeness should be made only when sites are climatologically similar, as the project site and the Lemoore NAS station clearly are. Representativeness has also been defined in the PSD Monitoring Guideline as data that characterize the air quality for the general area in which the proposed project would be constructed and operate. The large-scale topographic features that influence the Lemoore NAS monitoring station also influence the proposed project site in the same manner.

The orientation and aspect of terrain in the project area correlates well with the prevailing wind fields in the Lemoore NAS windrose, with little apparent influence by local terrain perturbations (such as small hill outcroppings or canyon orientations). Wind flow at the Lemoore monitoring station is therefore essentially identical to the project site. Thus, it is the Applicant's assessment that the wind direction and wind speed data collected at the Lemoore monitoring station are very similar to the dispersion conditions at the project site and to the regional area. The Lemoore windroses do not indicate any noticeable effects on the potential dispersion of pollutants from the project site on a regional scale from other influences. Thus, the Lemoore NAS data set satisfies the definition of representative data.

7 The five-year met data set includes 1992 through 1995 and 1997. Data for 1996 were not used because they did not meet the EPA criterion of being 90 percent complete.

The required emission source data inputs to ISCST3 include source locations, source elevations, stack heights, stack diameters, stack exit temperatures and velocities, and emission rates. The source locations are specified for a Cartesian (x,y) coordinate system where x and y are distances east and north in meters, respectively. The Cartesian coordinate system used is the Universal Transverse Mercator Projection (UTM). The stack height that can be used in the model is limited by federal Good Engineering Practice (GEP) stack height restrictions, discussed in more detail below. In addition, ISCST3 requires nearby building dimension data to calculate the impacts of building downwash.

For the purposes of modeling, a stack height beyond what is required by Good Engineering Practices is not allowed (SJVUAPCD Regulation 2-2-418). However, this requirement does not place a limit on the actual constructed height of a stack. GEP as used in modeling analyses is the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles. In addition, the GEP modeling restriction assures that any required regulatory control measure is not compromised by the effect of that portion of the stack that exceeds the GEP. The USEPA guidance ("Guideline for Determination of Good Engineering Practice Stack Height," Revised 6/85) for determining GEP stack height is as follows:

$$H_g = H + 1.5L$$

where

H_g = Good Engineering Practice stack height, measured from the ground-level elevation at the base of the stack

H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack

L = lesser dimension, height or maximum projected width, of nearby structure(s)

In using this equation, the guidance document indicates that both the height and width of the structure are determined from the frontal area of the structure, projected onto a plane perpendicular to the direction of the wind.

For the turbine/HRSG stacks, the nearby (influencing) structures are the HRSGs, which are 92 feet (28 m) high and 114 feet (35 m) long. Thus H = 92 ft and L = 92 feet, and H_g = 92 ft + (1.5 * 92 ft) = 230 ft, and the proposed stack height of 145 feet does not exceed GEP stack height.

For regulatory applications, a building is considered sufficiently close to a stack to cause wake effects when the downwind distance between the stack and the nearest part of the building is less than or equal to five times the lesser of the height or the projected width of the building. Building dimensions for the buildings analyzed as downwash structures were obtained from digital plot plans. The building dimensions were analyzed using the Building Profile Input Program (BPIP) to calculate 36 wind-direction-specific building heights and projected building widths for use in building wake calculations. The building dimensions used in the GEP analysis are shown in Appendix 8.1B, Table 8.1B-1 and Figure 8.1B-1.

Screening Procedures

To ensure the impacts analyzed were for maximum emission levels and worst-case dispersion conditions, a screening procedure was used to determine the inputs to the impact modeling. The screening procedure analyzed the turbine operating conditions that would result in the maximum impacts on a pollutant-specific basis. The operating conditions examined in this screening analysis, along with their exhaust and emission characteristics, are shown in Appendix 8.1B, Table 8.1B-2. These operating conditions represent maximum and minimum turbine loads (100 percent and 70 percent) at maximum and minimum ambient operating temperatures (100°F and 32°F).

The operating conditions were screened for worst-case ambient impact using USEPA's ISCST3 model and five years of meteorological data collected at the Lemoore NAS, as described above. The results of the screening procedure are presented in Appendix 8.1B, Table 8.1B-3. The screening analysis showed that except for annual average PM_{10}, impacts under Case 1 (turbine operating at 100 percent load with duct firing at hot ambient temperature) were the highest for each pollutant and averaging period. Case 2 (minimum load, hot ambient temperature) had the highest annual average PM_{10} impacts. The stack parameters and emission rates for these operating conditions were used in the refined modeling analyses to evaluate the modeled impacts of the entire project for each pollutant and averaging period.

Because the emergency generator and fire pump will not be tested during the same hour, these units were also screened to determine which had the higher impacts for each pollutant during that averaging period. The generator screening analysis showed that the fire pump had higher impacts for CO and SO_2 while the emergency generator had higher one-hour NO_x impacts. The unit with higher modeled impacts was included in assessing one-hour average impacts. Both units were included in the assessment of impacts during other averaging periods. The results of the emergency equipment screening analysis are shown in Appendix 8.1B, Table 8.1B-4.

The screening analyses included simple, intermediate, and complex terrain. Terrain features were taken from USGS DEM data and 7.5 minute quadrangle maps of the area. For the screening analysis, the CEC staff's recommendation regarding receptor grid spacing has been followed.[8]

Refined Air Quality Impact Analysis

The operating conditions and emission rates used to model ambient air quality impacts from the project are summarized in Table 8.1-23. The complete modeling input for each pollutant and averaging period is shown in Appendix 8.1B, Table 8.1B-5.

The model receptor grids were derived from 30-meter DEM data. The CEC guidance cited above was used to locate receptors. Thirty-meter refined receptor grids were used in areas where the coarse grid analyses indicated modeled maxima for each site plan would be located. A map showing the layout of each modeling grid around the site plan is presented in Figure 8.1-18.

Receptors for the refined modeling analysis were from USGS DEM data for six 7.5-minute quadrangles and included Cantua, Helm, Jameson, Kerman, San Joaquin and Tranquil.[9] The refined grid contained more than 16,700 receptors at 30-meter resolution.

Specialized Modeling Analyses

Fumigation Modeling. Fumigation occurs when a stable layer of air lies a short distance above the release point of a plume and unstable air lies below. Under these conditions, an exhaust plume may be drawn to the ground, causing high ground-level pollutant concentrations. Although fumigation conditions rarely last as long as one hour, relatively high ground-level concentrations may be reached during that time.

The SCREEN3 model was used to evaluate maximum ground-level concentrations for short-term averaging periods (24 hours or less). Guidance from the USEPA[10] was followed in evaluating

8 Joseph M. Loyer to Bob Haussler and Mike Ringer, CEC, "Modeling Protocol for MID's II Turbine," April 11, 2001: 30-m spacing to 0.5 km from fenceline; 100-m spacing between 0.5 and 1 km from fenceline; and 250-m spacing from 1.0 to 10 km from fenceline.

9 A figure depicting the area that extends to 10 km from the project site is included in the Public Health section as Figure 8.6-2. Copies of the USGS quadrangle maps at a scale of 1:24,000 are being submitted to the CEC under separate cover.

fumigation impacts. Since SCREEN3 is a single-source model, each source was modeled separately. Fumigation impacts for the turbines and the auxiliary boiler were predicted to occur about 15 km and 5 km, respectively, from the facility. No fumigation was predicted to occur for the emergency generator or fire pump exhaust due to their short stacks. This analysis, which is shown in more detail in Appendix 8.1B, Table 8.1B-6, showed that impacts under fumigation conditions are expected to be lower than the maximum concentrations calculated by ISC under downwash conditions.

Turbine Startup. Facility impacts were also modeled during the startup of one turbine to evaluate short-term impacts under startup conditions. Emission rates used for this scenario were based on an engineering analysis of available data, which included source test data from startups of the gas turbine at the Crockett Cogeneration Project. A summary of the data evaluated in developing these emission rates was shown in Appendix 8.1A, Tables 8.1A-7a and 8.1A-7b. In accordance with guidance previously provided by the Energy Commission staff, turbine exhaust parameters for the minimum operating load point (70 percent) were used to characterize turbine exhaust during startup and a maximum one-hour NO_x emission rate of 240 lb/hr was used. The other two turbines were modeled using emissions rates and stack parameters for Case 1 (demonstrated in the screening analysis to result in the highest modeled impacts for these short-term averaging periods). Startup impacts were evaluated for the one-hour averaging period using ISCST3. Emission rates and stack parameters used in the startup modeling analysis are shown in Table 8.1-24. Results are summarized in Appendix 8.1B, Table 8.1B-7.

Ozone Limiting. With approval from the SJVUAPCD staff, one-hour NO_2 impacts were modeled using ISC3_OLM (Industrial Source Complex, Version 3, Ozone Limiting Method) Model (version 96113). While this version of ISCST3 is not based on the latest model ISCST3 update, this modeling analysis does not include any features (such as area sources or pit retention) that were affected by recent model updates.

ISC3_OLM uses hourly ozone data to perform ozone-limiting calculations on individual plumes on an hour-by-hour basis. In accordance with guidance provided by the SJVUAPCD staff, the concurrent ozone data collected at the nearest monitoring station to the project site, Fresno, were used for this analysis.

Missing hours in the ozone data set were filled in using linear interpolation if the period of missing data was 2 hours or less. If the data were missing for 3 or more hours, an average of the ozone data during the corresponding time periods during the rest of the same month was used to fill in the missing hours.

Turbine Commissioning. There are two high emissions scenarios possible during commissioning. The first would be the period prior to SCR system and oxidation catalyst installation, when the combustor is being tuned. Under this scenario, NO_x emissions would be high because the NO_x emissions control system would not be functioning and because the combustor would not be tuned for optimum performance. CO emissions would also be high because combustor performance would not be optimized and the CO emissions control system would not be functioning; however, CO emissions would not be expected to exceed levels analyzed under startup conditions.

The second high emissions scenario would occur when the combustor had been tuned but the SCR installation was not complete, and other parts of the turbine operating system were being checked out. This is likely to occur under transient conditions, characterized by minimum load operation. Since the combustor would be tuned but the control system installation would not be complete, CO levels would not be expected to be elevated above startup levels but NO_x levels would again be high. Therefore, this analysis was limited to ambient NO_2 impacts during commissioning.

10 USEPA-454/R-92-019, "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised."

TABLE 8.1-23
ISCST3 Model Input Data: Source Characteristics for Refined Modeling (emissions in grams per second)

Unit	NO_x	SO_2	CO	PM_{10}
1-Hour Average				
Turbine/Duct Burner 1, 2 and 3	3.00	0.23	4.38	n/a
Auxiliary Boiler	0.23	0.01	0.78	n/a
Emergency Generator[a]	0.81	n/a	0.85	n/a
Diesel Fire Pump Engine[a,b]	n/a	0.01	n/a	n/a
Cooling Tower (16 cells)	n/a	n/a	n/a	n/a
3-Hour Average				
Turbine/Duct Burner 1, 2 and 3	n/a	0.23	n/a	n/a
Auxiliary Boiler	n/a	0.01	n/a	n/a
Emergency Generator	n/a	3.8×10^{-4}	n/a	n/a
Diesel Fire Pump Engine[b]	n/a	4.0×10^{-3}	n/a	n/a
Cooling Tower (16 cells)	n/a	n/a	n/a	n/a
8-Hour Average				
Turbine/Duct Burner 1, 2 and 3	n/a	n/a	42.3	n/a
Auxiliary Boiler	n/a	n/a	0.78	n/a
Emergency Generator	n/a	n/a	0.11	n/a
Diesel Fire Pump Engine[b]	n/a	n/a	0.03	n/a
Cooling Tower (16 cells)	n/a	n/a	n/a	n/a
24-Hour Average				
Turbine/Duct Burner 1, 2 and 3	n/a	0.23	n/a	2.06
Auxiliary Boiler	n/a	0.01	n/a	0.42
Emergency Generator	n/a	4.7×10^{-5}	n/a	2.7×10^{-3}
Diesel Fire Pump Engine[b]	n/a	5.0×10^{-4}	n/a	9.7×10^{-3}
Cooling Tower (16 cells)	n/a	n/a	n/a	8.5×10^{-3}
Annual Average				
Turbine/Duct Burner 1, 2 and 3	2.54	0.21	n/a	1.78
Auxiliary Boiler	0.08	4.9×10^{-3}	n/a	0.14
Emergency Generator	0.02	2.6×10^{-5}	n/a	1.5×10^{-3}
Diesel Fire Pump Engine[b]	6.3×10^{-3}	1.8×10^{-4}	n/a	2.7×10^{-4}
Cooling Tower (16 cells)	n/a	n/a	n/a	8.5×10^{-3}

[a] Emergency generator and Diesel fire pump engine will not be tested during the same hour. The unit with the higher modeled impacts is included in the refined modeling analysis for one-hour project impacts. See text.
[b] Fire pump operations will be restricted to 45 minutes out of any hour and 100 hours per year.

TABLE 8.1-24
Emission Rates and Stack Parameters Used In Modeling Analysis for Startup Emissions Impacts

Parameter	Value	
	1 Turbine in Startup	2 Turbine at Max. Load
Turbine stack temperature (deg K)	351.9	348.6
Turbine exhaust velocity (m/s)	14.96	19.13
One-hour average impacts		
NO_x emission rate (g/s)	30.24	2.995
SO_2 emission rate (g/s)	0.112	0.231
CO emission rate (g/s)	113.65	4.376

Preconstruction Monitoring

To ensure that the project impacts will not cause or contribute to a violation of an ambient air quality standard or an exceedance of a PSD increment, an analysis of the existing air quality in the project area is necessary. Federal regulations require preconstruction ambient air quality monitoring data for the purposes of establishing background pollutant concentrations in the impact area. However, a facility may be exempted from this requirement if the predicted air quality impacts of the facility do not exceed the *de minimis* levels listed in Table 8.1-25.

TABLE 8.1-25
PSD Preconstruction Monitoring Exemption Levels

Pollutant	Averaging Period	De minimis Level
CO	8-hr average	575 µg/m3
NO_2	annual average	14 µg/m3
SO_2	24-hr average	13 µg/m3

With USEPA approval, a facility may rely on air quality monitoring data collected at nearby monitoring stations to satisfy the requirement for preconstruction monitoring. In such a case, in accordance with Section 2.4 of the USEPA PSD guideline, the last three years of ambient monitoring data may be used if they are representative of the area's air quality where the maximum impacts occur due to the proposed source.

The background data need not be collected on site, as long as the data are representative of the air quality in the subject area (40 CFR 51, Appendix W, Section 9.2). Three criteria are applied in determining whether the background data are representative: (1) location, (2) data quality, and (3) data currentness.[11] These criteria are defined as follows:

- Location: The measured data must be representative of the areas where the maximum concentration occurs for the proposed stationary source, existing sources, and a combination of the proposed and existing sources.
- Data quality: Data must be collected and equipment must be operated in accordance with the requirements of 40 CFR Part 58, Appendices A and B, and PSD monitoring guidance.

11 Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), USEPA, 1987.

- Currentness: The data are current if they have been collected within the preceding three years and they are representative of existing conditions.

All of the data used in this analysis meet the requirements of Appendices A and B of 40 CFR Part 58, and thus all meet the criterion for data quality. All of the data have been collected within the preceding three years, and thus all meet the criterion for currentness. The locations of the data sets used to represent background concentrations of each pollutant are discussed individually below.

NO_2, CO, and PM_{10}. Ambient NO_2, CO, and PM_{10} data have been collected at the Fresno monitoring station for more than 10 years. The Fresno monitoring station is located approximately 28 miles northeast of the project site. As the project area itself is sparsely populated, there are few sources of air pollution (other than vehicle traffic) to affect air quality there. The ambient levels of NO_2, CO and PM_{10} monitored at the Fresno monitoring station are likely to be higher than the regional concentrations in the vicinity of the project, and thus meet the criterion for location.

SO_2. The nearest ambient SO_2 monitor to the project is in Bakersfield.[12] Bakersfield is far more populated and developed than the relatively rural and undeveloped project area, so even the extremely low measured SO_2 concentrations in Bakersfield are expected to overestimate background SO_2 levels there. Therefore, the Bakersfield SO_2 data provide a conservatively high background concentration for assessing the impacts of the project, and thus meet the location criterion.

Results of the Ambient Air Quality Modeling Analyses

The maximum facility impacts calculated from each of the modeling analyses described above are summarized in Table 8.1-26 below. The highest 1-hour average CO impacts are expected during turbine startup. The results of the fumigation modeling analysis are summarized in Appendix 8.1B, Table 8.1B-6.

Preconstruction monitoring was not required because the maximum ambient impacts do not exceed *de minimis* levels, as shown in Table 8.1-27.

TABLE 8.1-26
Summary Of Results From Refined Modeling Analyses

		Modeled Concentration (µg/m3)		
Pollutant	**Averaging Time**	**ISCST3**	**Fumigation**	**Startup**
NO_2	1-hour Annual	251.7[a,c] 0.6[b]	42.4 n/a	132.8[a] n/a
SO_2	1-hour 3-hour 24-hour Annual	20.7 4.6 0.4 0.03	1.2 n/a n/a n/a	3.7 n/a n/a n/a
CO	1-hour 8-hour	574.6 138.3	48.2 n/a	1,080.4 n/a
PM_{10}	24-hour Annual	4.9 0.5	n/a[d] n/a	n/a n/a

[a] Modeled using ISC_OLM with concurrent ozone data.
[b] Modeled annual NO_x corrected to NO_2 using ARM default value of 0.75.
[c] Worst-case one-hour NO_2 impacts are dominated by the emergency equipment, which will be operated for testing purposes 1 hour/week. Worst-case hourly average NO_2 impacts during other periods will be 39.9 $\mu g/m^3$.
[d] Fumigation is a short-term phenomenon and does not affect averaging periods as long as 24 hours.

12 As noted in Section 8.1.1.4.4, SO2 monitoring terminated at Fresno in 1997.

TABLE 8.1-27
Evaluation of Preconstruction Monitoring Requirements

Pollutant	Averaging Time	Exemption Concentration (µg/m3)	Maximum Modeled Concentration (µg/m3)	Monitoring Required?
NO_x	annual	14	0.6	no
SO_2	24-hr	13	0.4	no
CO	8-hr	575	138.3	no

Impacts During Turbine Commissioning

As discussed above, there are two potential scenarios under which NO_2 impacts could be higher than under other operating conditions already evaluated.

Scenario 1. Under this scenario, NO_x emissions can be conservatively estimated to be twice the guaranteed turbine-out level of 25 ppmvd @ 15 percent O_2, or 50 ppm. If operation under this condition were to continue for one hour, maximum hourly NO_x emissions at full load would be (50 ppm/2.5 ppm) * 17.79 lbs/hr = 355.8 lbs/hr.

Scenario 2. Under these lower load conditions, NO_x emissions could be as high as 100 ppm @ 15 percent O_2. Based on the transient nature of the loads, the average fuel consumption would be expected to be equivalent to half the full load flow rate, or 908 MMBtu/hr. Worst-case hourly NO_x emissions under this scenario would be (100 ppm/2.5 ppm) * 8.9 lbs/hr = 356 lbs/hr.

As the maximum hourly emissions under each scenario are expected to be the same, the maximum modeled NO_2 impact will occur under the turbine operating conditions that are less favorable for dispersion. These conditions are expected to occur at 70 percent load, because exhaust mass flow and thus final plume rise are lower than at full load.

An ISC_OLM modeling analysis using a NO_x emission rate of 44.856 g/s (356 lb/hr) and the appropriate 70 percent load stack parameters indicates that the maximum modeled one-hour NO_2 impact during commissioning is not expected to exceed 148.0 $\mu g/m^3$. This is lower than the maximum modeled one-hour NO_2 impact from the facility as a whole, as shown in Table 8.1-25. Using the background NO_2 concentration of 210.6 $\mu g/m^3$, the total impact will not exceed 358.6 $\mu g/m^3$, which is well below the state one-hour NO_2 standard of 470 $\mu g/m^3$.

Ambient Air Quality Impacts

To determine a project's air quality impacts, the modeled concentrations are added to the maximum background ambient air concentrations and then compared to the applicable ambient air quality standards. The modeled concentrations have already been presented in earlier tables. The maximum background ambient concentrations are listed in the following text and tables. A detailed discussion of why the data collected at these stations are representative of ambient concentrations in the vicinity of the project was provided above.

Table 8.1-28 presents the maximum concentrations of NO_x, CO, PM_{10}, and SO_2, recorded for 1997 through 2000 from the Fresno and Bakersfield stations, respectively. Maximum ground-level impacts due to operation of the project are shown together with the ambient air quality standards in Table 8.1-29. Using the conservative assumptions described earlier, the results indicate that the project will not cause or contribute to violations of any state or federal air quality standards, with the exception of the state PM_{10} standard. For this pollutant, existing concentrations already exceed the standard.

TABLE 8.1-28
Maximum Background Concentrations, 1997-2000 (µg/m3)

Pollutant	Averaging Time	1997	1998	1999	2000
Fresno					
NO_2	1-Hour	173.0	210.6	193.6	176.7
	Annual	39.6	37.7	43.4	37.7
Fresno/Bakersfield					
SO_2	1-Hour	26	n/a	28.6	49.4
	3-Hour	13	n/a	23.4	44.2
	24-Hour	7.9	n/a	15.8	23.6
	Annual	0	n/a	8.0	5.3
Fresno					
CO	1-Hour	15,000	11,250	11,250	10,000
	8-Hour	6,322	6,533	6,144	5,822
PM_{10}	24-Hour	124	141	154	138
	Annual (AGM)[a]	37.1	27.1	35.8	29.5
	Annual (AAM)[b]	42.6	33.7	44.6	34.8

[a] Annual Geometric Mean
[b] Annual Arithmetic Mean

TABLE 8.1-29
Modeled Maximum Project Impacts

Pollutant	Averaging Time	Maximum Facility Impact (µg/m3)	Background (µg/m3)	Total Impact (µg/m3)	State Standard (µg/m3)	Federal Standard (µg/m3)
NO_2	1-hour [a]	251.7	211	462.7	470	-
	Annual	0.6	43	43.6	-	100
SO_2	1-hour	20.7	49	69.7	650	-
	3-hour	4.6	44	48.6	-	1300
	24-hour	0.4	24	24.4	109	365
	Annual	0.03	8	8	-	80
CO	1-hour	1,080.4	15,000	16,080	23,000	40,000
	8-hour	138.3	6,533	6,671	10,000	10,000
PM_{10}	24-hour	4.9	154	158.9	50	150
	Annual[b]	0.5	37.1	37.6	30	-
	Annual[c]	0.5	44.6	45.1	-	50

[a] Worst-case one-hour NO_x impacts are dominated by the Diesel fire pump and emergency generator, which will be operated for testing purposes only one hour per week. Worst-case hourly average NO_2 impacts during other periods will be only 39.9 μg/m3.
[b] Annual Geometric Mean
[c] Annual Arithmetic Mean

PSD Increment Consumption

The Prevention of Significant Deterioration (PSD) program was established to allow emission increases (increments of consumption) that do not result in significant deterioration of ambient air quality in areas where criteria pollutants have not exceeded the National Ambient Air Quality Standards (NAAQS). For the purposes of determining applicability of the PSD program requirements, the following regulatory procedure is used.

- Project emissions are evaluated to determine whether the potential increase in emissions will be significant. Because this facility is a new major facility, the level of emissions that requires an analysis of ambient impacts is determined on a pollutant-specific basis. The emissions increases are those that will result from the proposed new equipment. For new facilities that include large gas turbines with fired HRSGs, USEPA considers a potential increase of 100 tons per year of any of the criteria pollutants to be significant. In this specific case, CVEC is considered a new major source. Table 8.1-30 compares the potential emissions increases with the levels considered significant.

TABLE 8.1-30
Comparison of Emissions Increase with PSD Significant Emissions Levels

Pollutant	Emissions (tons per year)	Significant Emission Levels (tons per year)	Significant?
NO_x	268	100	Yes
SO_2	22	100	No
CO	950	100	Yes

- If an ambient impact analysis is required, the analysis is first used to determine if the impact levels are significant. The determination of significance is based on whether the impacts exceed established significance levels (40 CFR 52.21) shown in Table 8.1-31. If the significance levels are not exceeded, no further analysis is required.

TABLE 8.1-31
PSD Levels of Significance

Pollutant	Averaging Time	Significant Impact Levels	Maximum Allowable Increments
NO_2	Annual	1 $\mu g/m^3$	25 $\mu g/m^3$
SO_2	3-hour 24-Hour Annual	25 $\mu g/m^3$ 5 $\mu g/m^3$ 1 $\mu g/m^3$	512 $\mu g/m^3$ 91 $\mu g/m^3$ 20 $\mu g/m^3$

- If the significance levels are exceeded, an analysis is required to demonstrate that the allowable increments will not be exceeded, on a pollutant-specific basis. Increments are the maximum increases in concentration that are allowed to occur above the baseline concentration. These PSD increments are also shown in Table 8.1-31.

Table 8.1-32 shows that the project will be a major source of NO_x and CO.[13] Emissions of SO_2 and VOC from the project will be below the 100 ton per year major source threshold. However, since the project is considered major for at least one criteria pollutant, PSD review is required for the entire facility.

13 Although annual PM_{10} emissions from the facility will exceed 100 tpy, the facility is not subject to PSD review for PM_{10} because the SJVUAPCD has been designated nonattainment for that pollutant.

TABLE 8.1-32
Comparison of Maximum Modeled Impacts and PSD Significance Thresholds

Pollutant	Averaging Time	Maximum Modeled Impacts (µg/m3)	Significance Threshold (µg/m3)	Significant?
NO_2	Annual	0.6	1	no
SO_2	3-Hour	4.6	25	no
	24-Hour	0.4	5	no
	Annual	0.03	1	no

The maximum modeled impacts from the project are compared with the significance levels in Table 8.1-32 above. These comparisons show that these impacts are below all significance thresholds and no further analysis is required.

8.1.5.2 Screening Health Risk Assessment

The screening health risk assessment (SHRA) was conducted to determine expected impacts on public health of the noncriteria pollutant emissions from the facility. The SHRA was conducted in accordance with the CAPCOA Air Toxics "Hot Spots' Program Revised 1992, Risk Assessment Guidelines" (October 1993) and the San Joaquin Valley Air Quality Management District "Risk Management Policy for Permitting New and Modified Sources" (March 2001). The SHRA estimated the offsite cancer risk to the maximally exposed individual (MEI), as well as indicated any adverse effects of non-carcinogenic compound emissions. The CARB/OEHHA Health Risk Assessment computer program was used to evaluate multipathway exposure to toxic substances. Because of the conservatism (overprediction) built into the established risk analysis methodology, the actual risks will be lower than those estimated.

A health risk assessment requires the following information:

- Unit risk factors (or carcinogenic potency values) for any carcinogenic substances that may be emitted
- Noncancer Reference Exposure levels (RELs) for determining non-carcinogenic health impacts
- One-hour and annual average emission rates for each substance of concern
- The modeled maximum offsite concentration of each of the pollutants emitted

Pollutant-specific unit risk factors are the estimated probability of a person contracting cancer as a result of constant exposure to an ambient concentration of 1 $\mu g/m^3$ over a 70-year lifetime. The SHRA uses unit risk factors specified by the California Office of Environmental Health Hazard Assessment (OEHHA). The cancer risk for each pollutant emitted is the product of the unit risk factor and the modeled concentration. All of the pollutant cancer risks are assumed to be additive.

An evaluation of the potential noncancer health effects from long-term (chronic) and short-term (acute) exposures has also been included in the SHRA. Many of the carcinogenic compounds are also associated with noncancer health effects and are therefore included in the determination of both cancer and noncancer effects. RELs are used as indicators of potential adverse health effects. RELs are generally based on the most sensitive adverse health effect reported and are designed to protect the most sensitive individuals. However, exceeding the REL does not automatically indicate a health impact. The OEHHA reference exposure levels were used to determine any adverse health effects from noncarcinogenic compounds. A hazard index for each noncancer pollutant is then determined by the ratio of the pollutant annual average concentration to its respective REL for a chronic evaluation. The individual indices are summed to determine the overall hazard index for the project. Because noncancer compounds do not target the same system or organ, this sum is considered conservative. The same procedure is used for the acute evaluation.

For this health risk assessment, weighted risk was modeled for each emissions unit and potential hazard, instead of emissions, as follows.

First, emissions of each noncriteria pollutant were calculated for each source, as discussed in Section 8.1.5.1.1. Emissions were also calculated in units of grams per second for the one-hour and annual averaging periods.

For acute exposures, the one-hour emission rate for each pollutant having an acute REL was divided by the corresponding REL (in $\mu g/m^3$) to calculate a weighted risk for each pollutant. The weighted risk values were then summed to calculate an overall weighted risk "rate" for the source. These risk "rates" were then modeled in place of emission rates from each source, and the model output was the acute health hazard index at each receptor.

Chronic inhalation exposures were treated the same way, except that the annual emission rates and chronic inhalation RELs were used.

For chronic noninhalation pathways and cancer risks, multipathway weighting factors were determined using the ARB's HRA model with emission rates and χ/Q equal to 1.0 g/s and 1.0 $\mu g/m^3$ per g/s, respectively. For chronic noninhalation exposure, the average dose/REL output by the model was expressed in units of average dose/REL per $\mu g/m^3$ (because an exposure of 1.0 $\mu g/m^3$ produced the average dose/REL shown). Therefore, the value reported by the model for each pollutant for which there are chronic noninhalation effects was multiplied by the annual average emission rate for that pollutant, and those values were summed into a single value that was used as the chronic noninhalation exposure "rate" for the cooling tower.[14]

A similar procedure was used to determine multipathway weighting factors for cancer risk. In this case, the HRA model output was the individual cancer risk by pollutant and route, based on an exposure of 1.0 $\mu g/m^3$. Individual cancer risks were shown by pollutant and route, in units of risk per $\mu g/m^3$ of exposure. To calculate multipathway exposure factors for pollutants with noninhalation pathway cancer effects (arsenic, lead, and PAHs), the risk for each pollutant was summed across pathways and then divided by the risk for the inhalation pathway. To calculate the weighted risk for each source, the annual average emission rate in g/s for each pollutant was multiplied by the inhalation cancer risk for that pollutant, in $(\mu g/m^3)^{-1}$, and by the applicable multipathway factor. The resulting weighted cancer risks for each pollutant were then summed for the source, and the total weighted risk "rate" was used in place of emission rates in the modeling analysis. The model output was then total cancer risk at each receptor.

Details of the calculations of risk "rates" for modeling are shown in Appendix 8.1C, Tables 8.1C-1 through 8.1C-4.

SHRA results for the project are compared with the established risk management procedures for the determination of acceptability. The established risk management criteria include those listed below.

- If the potential increased cancer risk is less than one in a million, the facility risk is considered "de minimis"; that is, not significant.

14 Only the cooling tower will emit pollutants that have chronic noninhalation impacts. Of the pollutants included in the health risk assessment, only arsenic, beryllium, cadmium, and mercury have noninhalation effects.

- If the potential increased cancer risk is greater than one in a million but less than ten in a million and Toxic Best Available Control Technology (T-BACT) has been applied to reduce risks, the facility risk is considered acceptable.
- If the potential increased cancer risk is greater than ten in a million and there are mitigating circumstances that, in the judgment of a regulatory agency, outweigh the risk, the risk is considered acceptable.
- For noncancer effects, total hazard indices of one or less are considered “de minimis” (not significant).
- For a hazard index greater than one, T-BACT must be used and the District must conduct a more refined review of the analysis and determine whether the impact is acceptable.

The SHRA includes the noncriteria pollutants listed above in Table 8.1-22. The receptor grid described earlier for criteria pollutant modeling was used for the SHRA. The nearest sensitive receptor is an elementary school located just under 1.0 mile south of the project site. There are also a few residences (primarily farmers) in the vicinity of the site. Sensitive receptors within a 3-mile radius of the project site are shown on Figure 8.6-1 in the public health section of the AFC (Section 8.6). Further description of sensitive receptors within a 3-mile radius of the project site is presented in the hazardous materials section, Section 8.12.

The SHRA results for the proposed project are presented in Table 8.1-33, and the detailed calculations are provided in Appendix 8.1C. The locations of the maximum modeled risks are shown in Figure 8.1C-1.

TABLE 8.1-33
Screening Health Risk Assessment Results

Type of Risk	Maximum Modeled Risk
Cancer Risk to Maximally Exposed Individual	0.08 in one million (including Diesel fire pump)
Acute Inhalation Hazard Index	0.35
Chronic Inhalation Hazard Index	0.44
Chronic Noninhalation Exposure	Max. Dose/REL = 2.8×10^{-6}

The screening HRA results indicate that the acute and chronic hazard indices are well below 1.0, so are not significant. In addition, the maximum chronic noninhalation exposure is well below the REL so is also considered insignificant. The cancer risk to a maximally exposed individual is less than 0.08 in one million, well below the 1 in one million level. The screening HRA results indicate that, overall, the project will not pose a significant health risk at any location.

8.1.5.3 Visibility Screening Analysis

Two types of analyses are typically performed to evaluate potential visibility impacts on nearby Class I areas: (1) a regional haze analysis to determine the change in extinction in the Class I areas; and (2) a coherent plume impact analysis. As recommended in the Federal Land Managers’ Air Quality Related Values Workgroup (FLAG) Phase I Report (December 2000), regional haze analyses were performed for the Pinnacles Wilderness Class I area, which is located between 50 and 100 km from the project site.

Because there are no Class I areas within 50 km of the project site, no coherent plume impact analysis is required for this project.

Regional Haze Analysis. The CALPUFF model was used in screening mode to evaluate potential visibility impacts (haze) of the proposed project on the nearest Class I area, as discussed above. The modeling followed guidance provided by the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report, by Trent Proctor of the U.S. Forest Service (USFS) and John Notar with the National Park Service (NPS) (Federal Land Managers [FLMs]).

The CALPUFF model requires hourly, single station meteorological data as input, both surface and upper air. Based on the guidance contained in the IWAQM Phase 2 Summary Report, the CALPUFF model in the screening mode requires five years of single station meteorology. Five years of surface and upper air data from the Lemoore NAS were used.

As recommended by the IWAQM Phase 2 Report, the PCRAMMET meteorological preprocessor was used to process the surface, precipitation, and upper air data. PCRAMMET was run with wet deposition options as required in the Phase 2 Report. As such, the following domain averaged variables were used based on values expected in the modeling region:

- Minimum Obukhov length = 33 meters
- Anemometer height = 6.1 meters
- Roughness length = 0.73 meters
- Noon time albedo = 6
- Bowen ratio = 0.75
- Fraction of net radiation absorbed by ground = 0.150

CALPUFF also requires domain-averaged background ozone (O_3) and ammonia (NH_3) concentrations for the Mesopuff II chemistry algorithm. For O_3, five years of hourly monitoring data from a nearby meteorological station were used. For NH_3, a domain-average value of 10 ppb was selected based on guidance in the IWAQM Phase 2 Report for arid regions and input from the National Park Service.

To assess visibility impacts at the Class I area, the monthly background visual ranges and relative humidity correction factor (f(RH)) were based on guidance found in the Final Flag Report (December 2000).

8.1.5.3.1 Model Options

Based on the standard ISCST3 model defaults and IWAQM recommended values, the following model default options were used for the CALPUFF modeling:

- Number of X grid cells = 2
- Number of Y grid cells = 2
- Number of vertical layers = 1
- Grid spacing = 230 km
- Cell face height = 5000
- Minimum mixing height = 50 meters
- Maximum mixing height = 5000 meters (based on observational data)
- Minimum wind speed allowed for non-calm conditions = 0.5 m/s
- Vertical distribution used in the near field = gaussian
- Terrain adjustment method = partial plume path adjustment
- No puff splitting allowed
- Chemical mechanism = Mesopuff II scheme
- Wet and dry removal modeled

- Dispersion coefficients = PG dispersion coefficients
- PG sigma-y and z not adjusted for roughness
- Partial plume penetration of elevated inversion allowed
- Lateral turbulence not used

Receptor Grid

A polar grid was generated that contained receptors at each one-degree of arclength and that extended throughout the Class I area. The distance of the polar grid or rings was based on the minimum distance and maximum distance to the Class I area. In addition, one ring was placed within the Class I area. Therefore, the Class I area had three rings with 1080 receptors. The receptor elevations were determined from topographic maps for the project area. The maximum concentration found at any receptor within the Class I area was used to represent impacts at the area.

Emissions

As stated earlier, the combustion sources at the proposed project will utilize advanced NO_x control technology and natural gas fuel to achieve very low emission rates. Emissions from the project include NO_x, SO_2, and PM_{10}, all of which have the potential to interfere with visibility. Emissions used in the modeling analysis of visibility impacts are the same as those used for the criteria pollutant modeling analysis. The parameters modeled for the visibility impacts assume that the particulate nitrate (NO_3-) is in the form of ammonium nitrate (NH_4NO_3) and that particulate sulfate (SO_4-) is in the form of ammonium sulfate ($(NH_4)_2SO_4$). The visibility calculation is based on the ambient concentrations of NH_4NO_3, $(NH_4)_2SO_4$, and PM_{10}, along with a representative relative humidity adjustment factor.

Impacts

The maximum 24-hour visibility impact was generated by taking the maximum 24-hour average modeled concentration at each receptor, regardless of the season in which it occurred, and assigning it to represent the visibility impact at the Class I areas. To calculate extinction coefficients, the following general equation was used in the CALPOST postprocessing model:

$$b_{ext} = b_{SN} * f(RH) + b_{dry}$$

where:

b_{ext} = particle scattering coefficient
b_{SN} = $3[((NH_4)_2SO_4) + (NH_4NO_3)]$
b_{dry} = b_{Coarse}

The quantities in brackets are the masses expressed in $\mu g/m^3$ and can be further broken down into the following equations:

b_{NO3} = $3[1.29(NO_3)f(RH)]$
b_{SO4} = $3[1.375(SO_4)f(RH)]$
b_{Coarse} = $0.6[PM_{10}]$

Using the above equations to calculate the extinction coefficients and correcting for monthly f(RH), Table 8.1-34 summarizes the maximum extinction coefficients and the total extinction. As shown in Table 8.1-34, during operation of the proposed project, potential visibility impacts to the Pinnacles Wilderness Class I area will be less than the 5-percent level of acceptable change.

TABLE 8.1-34
Maximum Modeled Impacts in Protected Areas

Class I Area	B_{NO3} (Mm^{-1})	B_{SO4} (Mm^{-1})	B_{fine} (Mm^{-1})	24-Hour Average Visibility Impact (Mm^{-1})	Percent Change in Extinction
Pinnacles Wilderness	0.805	0.000	0.114	0.919	4.95%

8.1.5.4 Construction Impacts Analysis

Emissions due to the construction phase of the project have been estimated, including an assessment of emissions from vehicle and equipment exhaust and the fugitive dust generated from material handling. A dispersion modeling analysis was conducted based on these emissions. A detailed analysis of the emissions and ambient impacts is included in Appendix 8.1D. The results of the analysis indicate that the maximum construction impacts will be below the state and federal standards for all the criteria pollutants emitted. The best available emission control techniques will be used. The construction site impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards.

Combustion Diesel PM_{10} emission impacts have also been evaluated to demonstrate that the carcinogenic risk from construction activities will be below one in one million. This risk screening analysis is also included in Appendix 8.1D.

8.1.6 Consistency with Laws, Ordinances, Regulations, and Standards

8.1.6.1 Consistency with Federal Requirements

The San Joaquin Valley Air Quality Management District (District) has been delegated authority by the USEPA to implement and enforce most federal requirements that are applicable to the project, including the new source performance standards. However, the District has not been delegated authority for PSD review. Compliance with the District regulations ensures compliance and consistency with the corresponding federal requirements. However, a separate PSD application will also be submitted to the USEPA.

The project will also be required to comply with the Federal Acid Rain requirements (Title IV). Since the District has received delegation for implementing Title IV through its Title V permit program, CVEC will secure a District Title V permit that imposes the necessary requirements for compliance with the Title IV Acid Rain provisions.

As discussed in AFC Section 8.1.5, Laws, Ordinances, Regulations and Standards, the federal PSD program requirements apply on a pollutant-specific basis to the following:

- A new major facility that will emit 100 tpy or more, if it is one of the 20 PSD source categories in the federal Clean Air Act, or a new facility that will emit 250 tpy or more; or
- A major modification to an existing major facility that will result in net emissions increases in excess of significant emissions levels.

The proposed project is a new major facility. The emissions levels summarized in Table 8.1-30 showed that the project is subject to PSD review for NO_x and CO, because emissions of those pollutants exceed the 100 tpy significance thresholds.

Because the project is subject to PSD review for NO_x and CO, the facility is required to use BACT to control these pollutants. The discussion of BACT for NO_x and CO is provided below in Section 8.1.6.3.

40 CFR § 52.21 (k) requires that the modeling be conducted with appropriate meteorological and topographic data necessary to estimate impacts. The modeling analyses used USGS topographic data for the surrounding area and weather data gathered at Lemoore NAS.

40 CFR § 52.21 (k) also requires a demonstration that emission increases subject to the PSD program will not interfere with the attainment or maintenance of any NAAQS for each applicable pollutant. As shown in Table 8.1-29, the proposed project will not cause or contribute to an exceedance of any federal ambient air quality standard for which the District is in attainment of the standards. The modeling analysis is discussed in detail in Section 8.1.8.1.

For an application that triggers PSD modeling requirements, 40 CFR §52.21 (m) requires that ambient monitoring data be gathered for one year preceding the submittal of a complete application, or an USEPA-approved representative time period. However, if the air quality impacts of the facility do not exceed the specified *de minimis* levels, on a pollutant-specific basis, the facility is exempted from the preconstruction monitoring requirement. The air quality impacts of the project's NO_x and CO emissions are below the applicable *de minimis* levels, as shown in Table 8.1-25, and therefore the preconstruction monitoring requirements are not applicable.

40 CFR § 52.21 (o) requires the Applicant to provide an analysis of the impairment to visibility, soils and vegetation that would occur as a result of the proposed project. These analyses are provided in Sections 8.1.6.5, 6.4, and 6.6 of the AFC, respectively.

40 CFR § 52.21 (p) requires applications to demonstrate that emissions from a new or modified facility will not cause or contribute to the exceedances of any NAAQS or any applicable Class I PSD increment. Impacts on visibility must also be evaluated for Class I areas within 100 km of the facility. Since the nearest Class I area is more than 100 km from the proposed facility, no additional impacts analysis is required.

8.1.6.2 Consistency with State Requirements

State law sets up local air pollution control districts and air quality management districts with the principal responsibility for regulating emissions from stationary sources. As discussed above, the project is under the local jurisdiction of the District, and compliance with District regulations will ensure compliance with state air quality requirements.

8.1.6.3 Consistency with Local Requirements: San Joaquin Valley Air Quality Management District (District)

The District has been delegated responsibility for implementing local, state, and federal air quality regulations in the eight counties[15] within the District. The project is subject to District regulations that apply to new sources of emissions, to the prohibitory regulations that specify emission standards for individual equipment categories, and to the requirements for evaluation of impacts from toxic air pollutants. The following sections include the evaluation of facility compliance with the applicable District requirements.

Under the regulations that govern new sources of emissions, CVEC is required to secure a preconstruction Determination of Compliance from the District (Rule 2201), as well as demonstrate continued compliance with regulatory limits when the project becomes operational. The

15 Including the portion of Kern County that is within the District boundaries.

preconstruction review includes demonstrating that the project will use best available control technology (BACT) and will provide any necessary emission offsets.

Applicable BACT levels are shown in Table 8.1-35, along with anticipated potential facility emissions. SJVUAPCD Rule 2201 requires the project to apply BACT for emissions of NO_x, VOC, SOx, and PM_{10} (criteria pollutants) in excess of 2.0 pounds per highest day. Rule 2201 also imposes BACT for emissions of CO, lead, asbestos, beryllium, mercury, fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, and reduced sulfur compounds when emitted in excess of specified amounts. With the exception of CO, the project will not emit any of these latter pollutants in detectable quantities; therefore, these latter BACT requirements are not applicable. As shown in the table, BACT is required for NO_x, VOC, SO_2, CO, and PM_{10}. The calculation of facility emissions was discussed in AFC Section 8.1.5.1.1.

BACT for the applicable pollutants was determined by reviewing the District BACT Guidelines Manual, the South Coast Air Quality Management District BACT Guidelines Manual, the most recent Compilation of California BACT Determinations, CAPCOA (2nd Ed., November 1993), and USEPA's BACT/LAER Clearinghouse. A summary of the review is provided in Appendix 8.1F. For the gas turbines and duct burners, the District considers BACT to be the most stringent level of demonstrated emission control that is feasible. The project will use the BACT measures discussed below.

TABLE 8.1-35
Facility Best Available Control Technology Requirements

Pollutant	Applicability Level	Facility Emission Level	BACT Required?
Criteria Pollutants: District Regulation 2201			
VOC	2 lbs/day	573 lbs/day	yes
NO_x	2 lbs/day	2369 lbs/day	yes
SO_2	2 lbs/day	135 lbs/day	yes
PM_{10}	2 lbs/day	1,283 lbs/day	yes
CO	100 tpy	950.5 tpy	yes
Noncriteria Pollutants: District Regulation 2201			
Lead	3.2 lbs/day	neg.	no
Asbestos	0.04 lbs/day	neg.	no
Beryllium	0.0022 lbs/day	neg.	no
Mercury	0.55 lbs/day	neg.	no
Fluorides	16.44 lbs/day	neg.	no
Sulfuric Acid Mist	38.35 lbs/day	neg.	no
Hydrogen Sulfide, Total Reduced Sulfur or Reduced Sulfur Compounds	54.79 lbs/day	neg.	no

As a BACT measure, the Applicant will limit the fuels burned at the project to natural gas, a clean burning fuel. Liquid fuels will not be fired at CVEC except in the emergency Diesel fire pump and emergency generator set. Burning of liquid fuels in the gas turbine combustors and duct burners would result in greater criteria pollutant emissions than if the units burned only gaseous fuels. This measure acts to minimize the formation of all criteria air pollutants.

BACT for NO_x emissions from the gas turbine will be the use of low NO_x emitting equipment and add-on controls. The Applicant has selected a gas turbine equipped with dry low NO_x combustors.

The gas turbine dry low NO_x combustors will generate approximately 25 ppmvd NO_x, corrected to 15 percent O_2. In addition, the turbines will be equipped with a selective catalytic reduction (SCR) system to further reduce NO_x emissions to 2.5 ppmvd NO_x, corrected to 15 percent O_2 on a one-hour average basis. Annual average NO_x emissions will not exceed 2.0 ppmvd @ 15 percent O_2 (excluding startups and shutdowns). The District BACT guidelines indicate that BACT from large gas turbines (>374 MMBtu/hr heat input) with heat recovery is an exhaust concentration not to exceed 2.5 ppmvd NO_x, corrected to 15 percent O_2; therefore, the project will meet the BACT requirements for NO_x. The duct burner will also be exhausted to the SCR system; therefore, BACT for the duct burner is also the stringent 2.5 ppmvd NO_x level, corrected to 15 percent O_2. The District BACT Guideline determination for NO_x from gas turbines is shown in Appendix 8.1E.

BACT for NO_x emissions from the auxiliary boiler will be the use of low NO_x emitting equipment and add-on controls. The Applicant has selected a boiler equipped with low NO_x burners, and will use SCR to achieve additional NO_x control. The boiler with low NO_x burners and SCR will generate less than 9 ppmvd NO_x, corrected to 3 percent O_2. The District BACT guidelines indicated that BACT from a boiler ($\geq$ 20 MMBtu/hr heat input) is a NO_x exhaust concentration not to exceed 9 ppmvd, corrected to 3 percent O_2, therefore, the project will meet the BACT requirements for NO_x. The District BACT Guideline determination for NO_x from boilers is shown in Appendix 8.1E.

BACT for CO emissions will be achieved by use of gas turbines equipped with dry low NO_x combustors and an oxidation catalyst. Dry low NO_x combustors emit low levels of combustion CO while still maintaining low NO_x formation. In addition, the project will use an oxidation catalyst system to further reduce CO emissions to 6.0 ppmvd NO_x, corrected to 15 percent O_2. The Applicant has specified a CO limit of 6 ppmvd, corrected to 15 percent O_2, for base load and part load operation. The District BACT guidelines indicate that BACT from large gas turbines (>374 MMBtu/hr heat input) is 6 ppmvd CO, corrected to 15 percent O_2. CO emissions from the gas turbines will meet the District BACT requirements. The CO emission rate from the gas turbine at the outlet of the exhaust stacks will not exceed 6 ppmvd, corrected to 15 percent O_2, except under startup and shutdown conditions. A review of recent BACT determinations for CO from gas turbines is provided in Appendix 8.1E.

BACT for CO emissions will be achieved by use of an auxiliary boiler equipped with an oxidation catalyst to achieve a CO emission rate of 50 ppmvd, corrected to 3 percent O_2. While the District BACT guidelines do not include a specific BACT level for CO, guidelines in other districts (such as the BAAQMD) indicate that BACT for boilers is 50 ppmvd at 3 percent O_2. The proposed CO emission rate will be consistent with these BACT determinations.

BACT for VOC emissions will be achieved by use of the gas turbine dry low NO_x combustors. As in the case of CO emission formation, dry low NO_x combustors use air to fuel ratios that result in low combustion VOC while still maintaining low NO_x levels. BACT for VOC emissions from combustion devices has historically been the use of best combustion practices. With the use of the dry low NO_x combustors and with the duct burner emission level, VOC emissions leaving the stacks will not exceed 2.0 ppmvd, corrected to 15 percent oxygen. This level of emissions is consistent with the District's BACT guidelines for large gas turbines.[16]

BACT for VOC emissions for the auxiliary boiler will be achieved by good combustion practices and an oxidation catalyst. The VOC emissions are 10 ppmvd, corrected to 3 percent O_2. The District BACT guidelines indicate that BACT for boilers ($\geq$ 20 MMBtu/hr) is natural gas fuel and good combustion practices. The low NO_x burners are designed to minimize incomplete combustion and therefore minimize VOC emissions.

16 Although the turbines/HRSGs will be equipped with oxidation catalysts, no VOC control effectiveness has been assumed.

For the turbines, duct burners, and auxiliary boiler, BACT for PM_{10} is best combustion practices and the use of gaseous fuels. As mentioned, use of clean burning natural gas fuel with a sulfur content of 0.25 gr/100 scf will result in minimal particulate emissions. BACT for the cooling tower is the use of high-efficiency drift eliminators with an emission rate of 0.0005 percent. This control efficiency has been proposed by similar projects that have recently been approved.

SO_2 emissions will be kept at a minimum by firing clean burning natural gas fuel with a sulfur content of 0.25 gr/100 scf.

In addition to the BACT requirements, District Rule 2201 requires the Applicant to provide full emission offsets when emissions exceed specified levels on a pollutant-specific basis. Offsets for CO are not required if the Applicant demonstrates to the satisfaction of the APCO that the ambient air quality standards for CO are not currently being violated and that the project will not cause or contribute to a violation of the standards. This showing was made in Section 8.1.5.1 (Table 8.1-29). As shown in Table 8.1-36, the project will be required to provide emission offsets for NO_x, PM_{10}, and VOC emissions.

TABLE 8.1-36
SJVUAPCD Offset Requirements and Project Emissions

Pollutant	Offset Threshold	Project Emission Rate[a]	Offsets Required
VOC	20,000 lb/yr	157,403 lb/yr	Yes
NO_x	20,000 lb/yr	535,038 lb/yr	Yes
PM_{10}	29,200 lb/yr	390,283 lb/yr	Yes
SO_2	54,750 lb/yr	43,630 lb/yr	No

[a] Excluding emergency equipment, which is exempt from offsets under District Rule 2201.

The NSR rule requires emission reductions to be provided at an offset ratio of between 1 and 1.5 to 1, depending upon the distance between the source and the offset location. Interpollutant offsets are permitted, at the discretion of the APCO.

The NSR rule also requires project denial if air quality modeling results indicate emissions will cause or exacerbate the violation of the applicable ambient air quality standards, after accounting for mitigation. The modeling analyses in Section 8.1.5.1 show that with the exception of PM_{10}, facility emissions will not interfere with the attainment or maintenance of the applicable air quality standards. Because the District is currently a nonattainment area for PM_{10}, any increase in PM_{10} emissions has the potential to exacerbate existing violations. However, the Applicant will be providing PM_{10} offsets to mitigate the impact of the emissions increase; as a result, the required finding can be made for PM_{10} as well.

Emissions offset requirements for NO_x, VOC, and PM_{10} are shown in Table 8.1-37 below, along with the quantity of credits currently held in the District Emission Reduction Credit Registry and the quantity of credits currently owned by the Applicant. Sufficient offsets are available through the District offset emissions bank and through sources that have not banked emissions with the District, such as facility closures. The District offset bank listing provides the required information for offset identification and assessment of the emission reduction levels achieved. The information includes:

- Ownership of emission offset sources; and
- Emission reduction credits granted by the District that have been determined to meet the District's requirements for bankable offsets.

TABLE 8.1-37
Facility Offset Requirements[a]

Pollutant	Facility Emissions (lbs/yr)	Total Credits in District Registry (lbs/yr)	Total Credits Currently Owned by Applicant (lbs/yr)
NO_x	535,038	17,477,489	1,982,805
VOC	157,403	16,295,019	717,543
SO_2[b]	n/a	n/a	1,002,411
PM_{10}	390,283	2,830,727	285,048

[a] Offsets generally must be provided on a quarterly basis. See Appendix 8.1F.

[b] Under the District's rules, the Applicant may provide SO_2 reductions to offset PM_{10} emission increases. See Appendix 8.1F.

A quarterly reconciliation of offset requirements and credits is included in Appendix 8.1F. The Applicant is identifying the specific credits that are expected to be used for this project in a separate, confidential filing. Because of the highly competitive nature of the offset market, confidential treatment of this offset list is being sought at this stage of the negotiations.

Rule 2520, Federal Part 70 Permits (Title V permit program) applies to facilities that emit more than 50 tons per year on a pollutant-specific basis. The Phase II acid rain requirements of Rule 2540 are also applicable to the facility. As a Phase II Acid Rain facility, CVEC will be required to provide sufficient allowances for every ton of SO_2 emitted during a calendar year. The Applicant will file the appropriate applications for Title V and acid rain permits, and will obtain any necessary allowances on the current open trade market. The power plant is also required to install and operate continuous monitoring systems on the new units.

The general prohibitory rules of the District applicable to the project and the determination of compliance follow.

Rule 4001 (New Source Performance Standards). Subparts Da and GG of this rule require monitoring of fuel; impose limits on the emissions of NO_x, PM, and SO_2; and require source testing of stack emissions, process monitoring, and data collection and recordkeeping. All of the BACT limits imposed on the facility will be more stringent than the requirements of the NSPS emission limits. Monitoring and recordkeeping requirements for BACT will be more stringent than the requirements in this rule; therefore, the facility will comply with the NSPS regulations.

Rule 4101 (Visible Emissions). Any visible emissions from the facility will not be darker than No. 2 when compared to a Ringlemann Chart for any period(s) aggregating 3 minutes in any hour. Because the facility will burn clean fuels, the opacity standard of not greater than 20 percent for a period or periods aggregating 3 minutes in any hour and the particulate emission concentrations limit of 0.15 grains per standard cubic feet of exhaust gas volume will not be exceeded.

Rule 4102 (Public Nuisance). The facility will emit insignificant quantities of odorous or visible substances; therefore, the facility will comply with this regulation.

Rule 4201 (Particulate Matter Emission Standards). The emission units will have particulate matter emission rates well below the limits of the rule. The maximum grain loading for the turbines and duct burners (from Table 8.1A-1, Appendix 8.1A) is 0.00274 gr/dscf, well below the 0.1 gr/dscf limit of the rule. Tables 8.1A-4 and 8.1A-5 show that the grain loadings for the emergency generator and fire pump engines are 0.0028 and 0.0031 gr/dscf, respectively, also well below the limit of the rule.

Rule 4701 (Internal Combustion Engines). The proposed Diesel emergency generator and firewater pump engine are exempt from this rule pursuant to sections 4.2.1 (standby engines) and 4.2.2 (engines used exclusively for fire fighting services and flood control), except for the administrative requirements of Sections 6.1 and 6.5. The information required by Section 6.1 is provided in this AFC; the recordkeeping requirements of Section 6.5 are expected to be imposed as permit conditions.

Rule 4703 (Stationary Gas Turbines). Emissions from the new turbine will be well below the limits in this rule.

Rule 4801 (Sulfur Compound Emissions). Because the project will use only natural gas fuel (with the exception of the emergency equipment, which will be operated for limited hours for testing), all of the Rule 4801 limits will easily be complied with.

Rule 7012 (Hexavalent Chromium – Cooling Towers). The proposed cooling tower will not use hexavalent chromium.

Rule 8010 (Fugitive Dust Administrative Requirements for Control of PM_{10}). This rule includes definitions, exemptions, requirements and fees related to the control of PM_{10}.

Rule 8020 (Fugitive Dust Requirements for Control of PM_{10} from Construction, Demolition, Excavation and Extraction Activities). This rule requires the use of reasonably available control measures (RACM) to control fugitive dust emissions during construction activities. The Applicant has committed to implementing RACM by using dust control measures during construction to minimize fugitive dust emissions.

8.1.7 Cumulative Air Quality Impacts Analysis

An analysis of potential cumulative air quality impacts that may result from the project and other reasonably foreseeable projects is generally required only when project impacts are significant.

To ensure that potential cumulative impacts of the project and other nearby projects are adequately considered, a cumulative impacts analysis was conducted in accordance with the protocol included as Appendix 8.1G.

8.1.8 Mitigation

Mitigation will be provided for all emissions increases from the project in the form of offsets and the installation of BACT, as required under District regulations. Because the cumulative air quality impacts analysis described in Appendix 8.1G showed that the project will not result in significant cumulative impacts, the Applicant believes that no additional mitigation is necessary beyond the offsets that will be provided in accordance with District requirements.

8.1.9 References

ARB. http://www.arb.ca.gov/adam

ARB. Emission Inventory Criteria and Guidelines Report for the Air Toxics "Hot Spots" Program, May 15, 1997.

ARB. Proposed Guidance for Power Plant Siting and Best Available Control Technology. June 23, 1999.

ARB. Proposed Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines. Draft, August 2000.

ARB. Reference Document for California Statewide Modeling Guideline. April 1989.

CAPCOA. Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines. October 1993.

Desert Research Institute, Energy and Environmental Engineering Center. A Study of the Ammonium Nitrate Particle Equivalent of NO_x Emissions. Final Report, March 9, 1999.

Office of Environmental Health Hazard Assessment. Acute and Chronic Exposure Levels Developed by OEHHA as of May 2000.

Office of Environmental Health Hazard Assessment. Hot Spots Unit Risk and Cancer Potency Values. June 9, 1999.

San Joaquin Valley Unified Air Pollution Control District. http://www.valleyair.org

Smith, T.B., W.D. Sanders, and D.M. Takeuchi. Application of Climatological Analysis to Minimize Air Pollution Impacts in California, Final Report on ARB Agreement A2-119-32. August 1984.

Ventura County Air Pollution Control District. AB 2588 Combustion Emission Factors. May 17, 2001.

U.S. Department of Commerce, Weather Bureau. “Climate of the States—California,” December 1959.

USEPA. Compilation of Emission Factors. AP-42. Revised 7/00.

USEPA. Guideline on Air Quality Models, 40 CFR, Part 51, Appendix W. July 1, 1999.

USEPA. On-Site Meteorological Program Guidance for Regulatory Model Applications, EPA-450/4-87-013. August 1995.

USEPA. Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised, EPA-454/R-92-019. October 1992.

USEPA. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), EPA-450/4-87-007. May 1987.

USEPA. Guideline for Determination of Good Engineering Practice Stack Height. June 1985.

USEPA. http://www.epa.gov/airs

Figure 8.1-1
January Predominant Mean Circulation of the Surface Winds

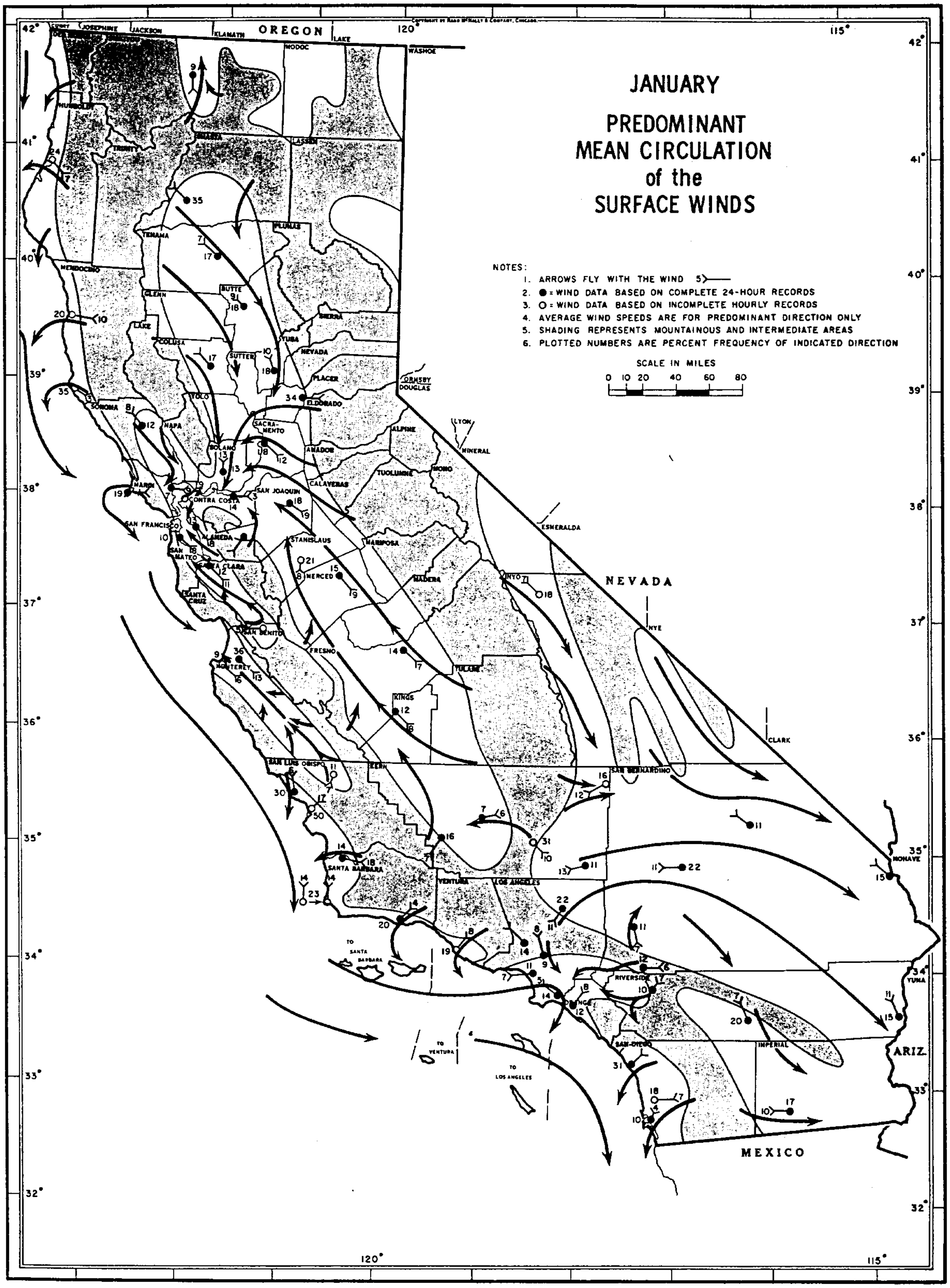


Figure 8.1-2
April Predominant Mean Circulation of the Surface Winds

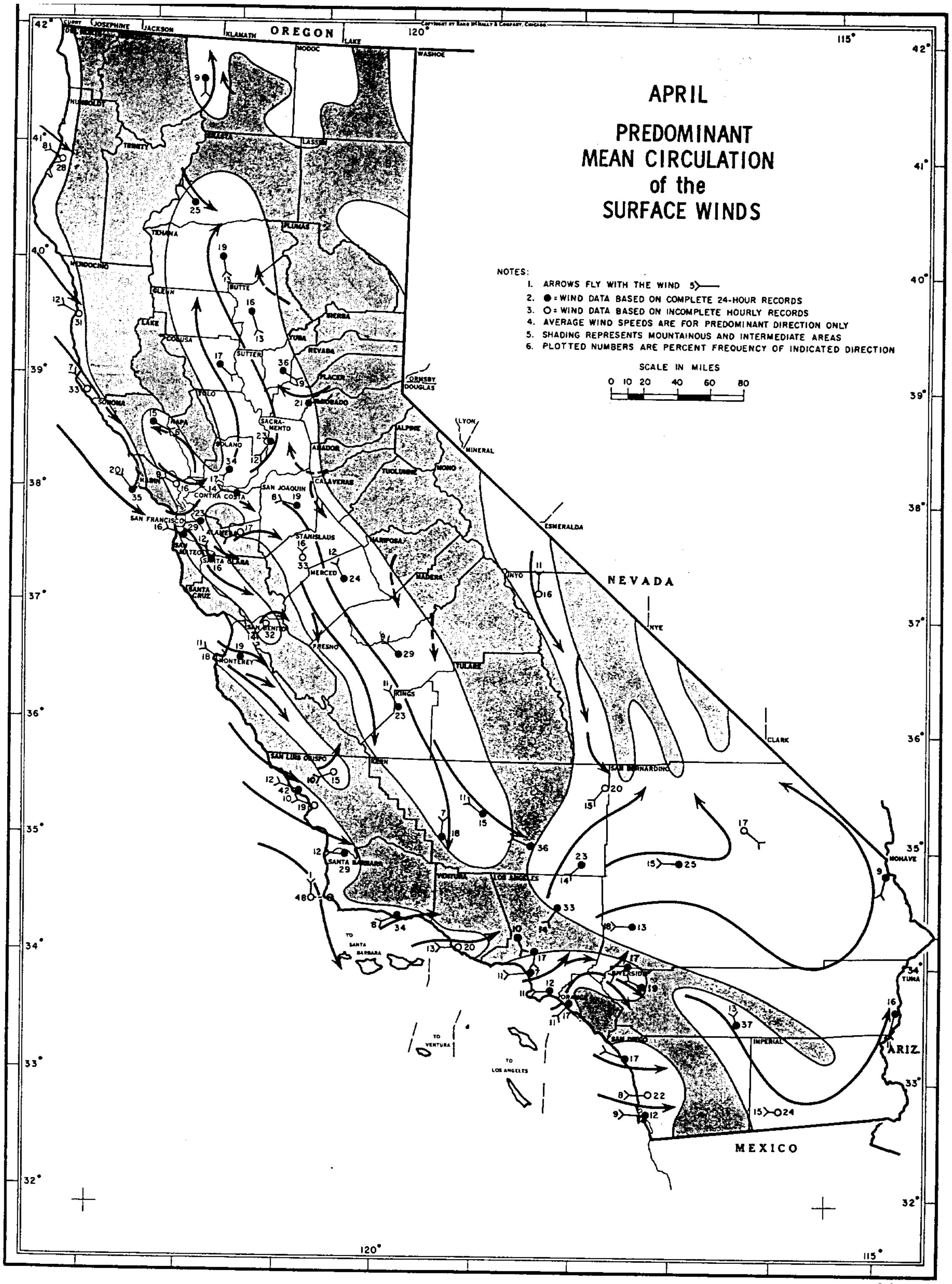


Figure 8.1-3
July Predominant Mean Circulation of the Surface Winds

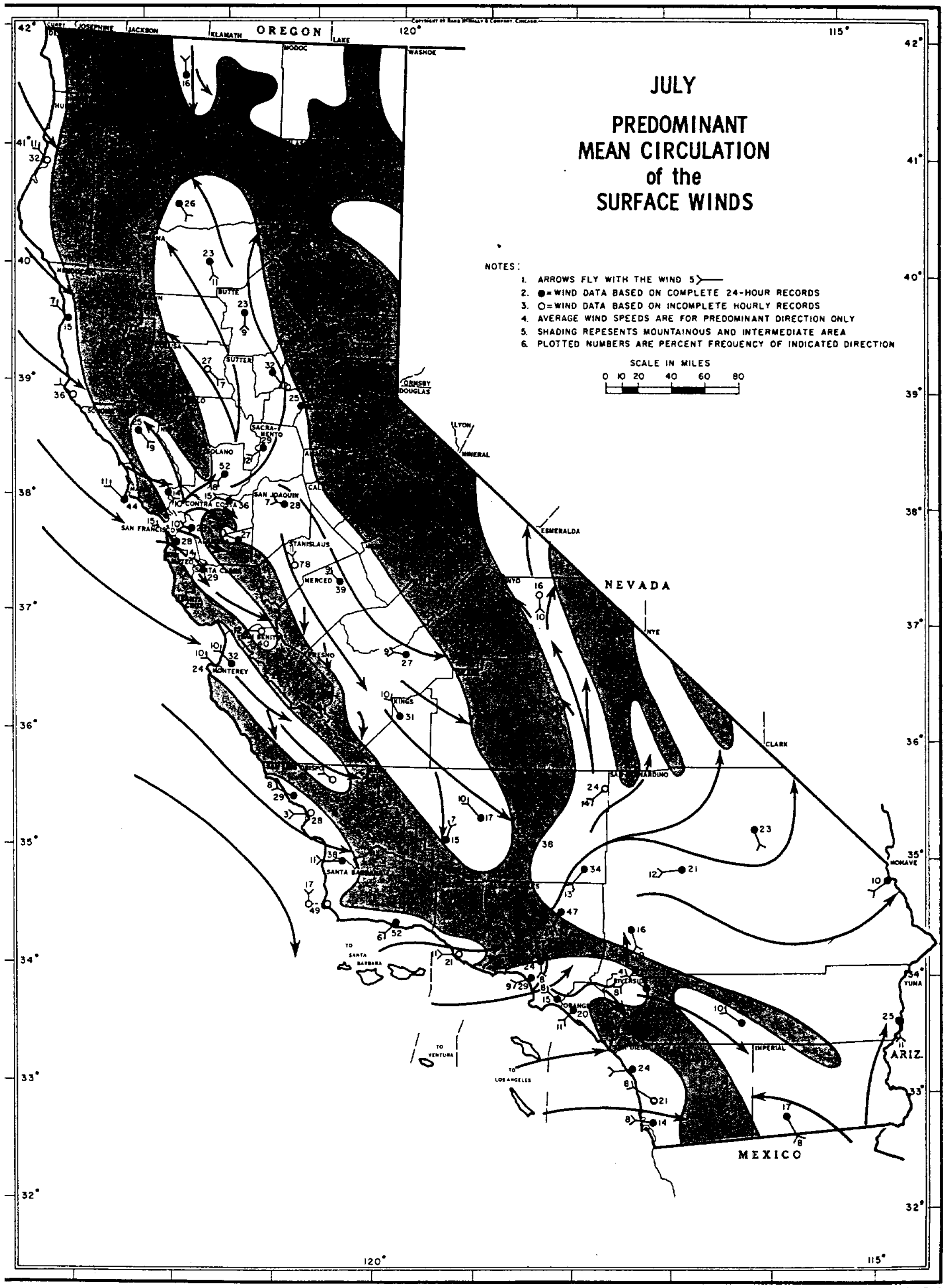
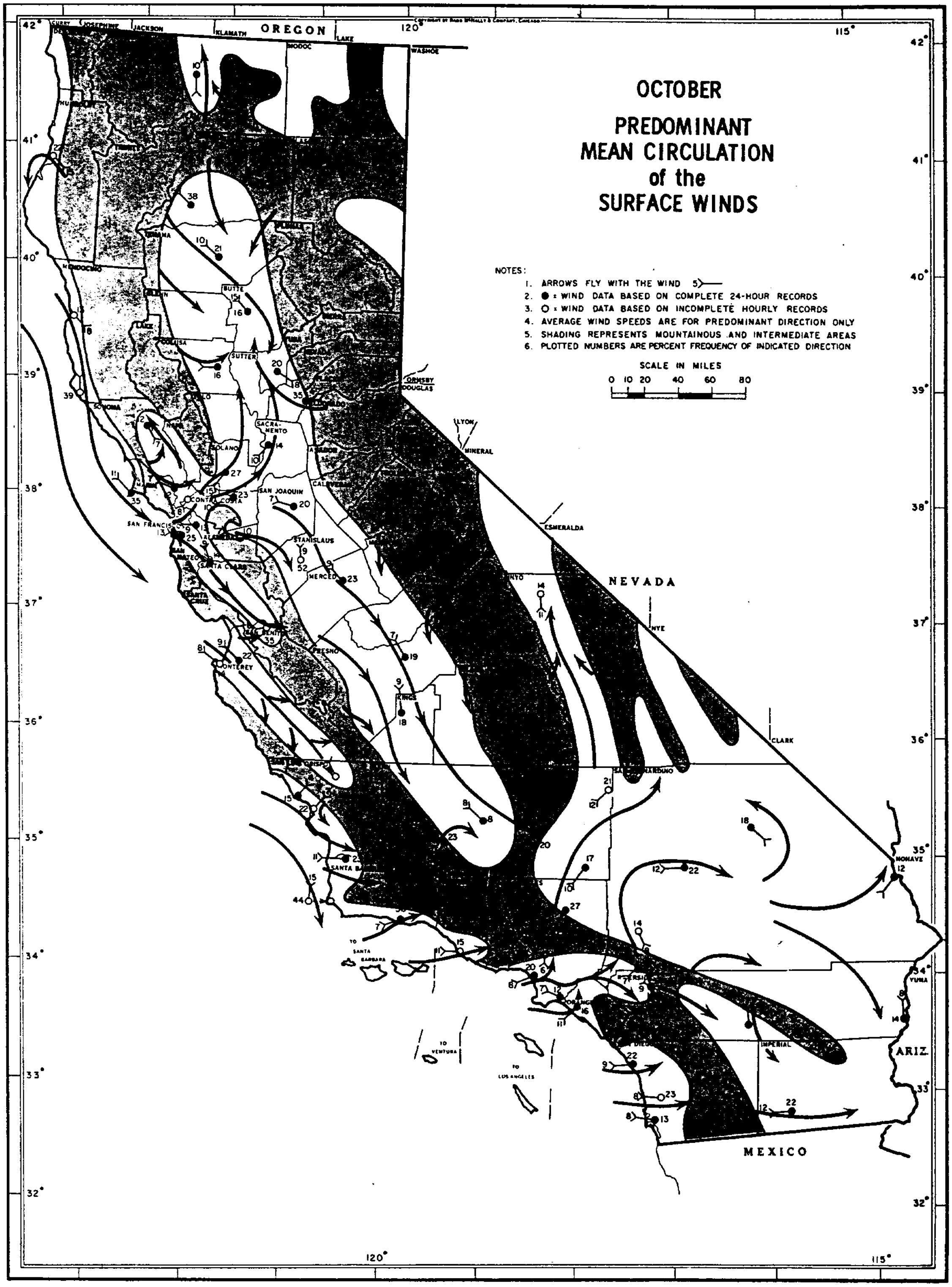


Figure 8.1-4
October Predominant Mean Circulation of the Surface Winds



C-2238-F-13

Figure 8.1-5a
Annual Wind Rose for Lemoore Naval Air Station
Averaged Over Five Years: 1992-1995 plus 1997

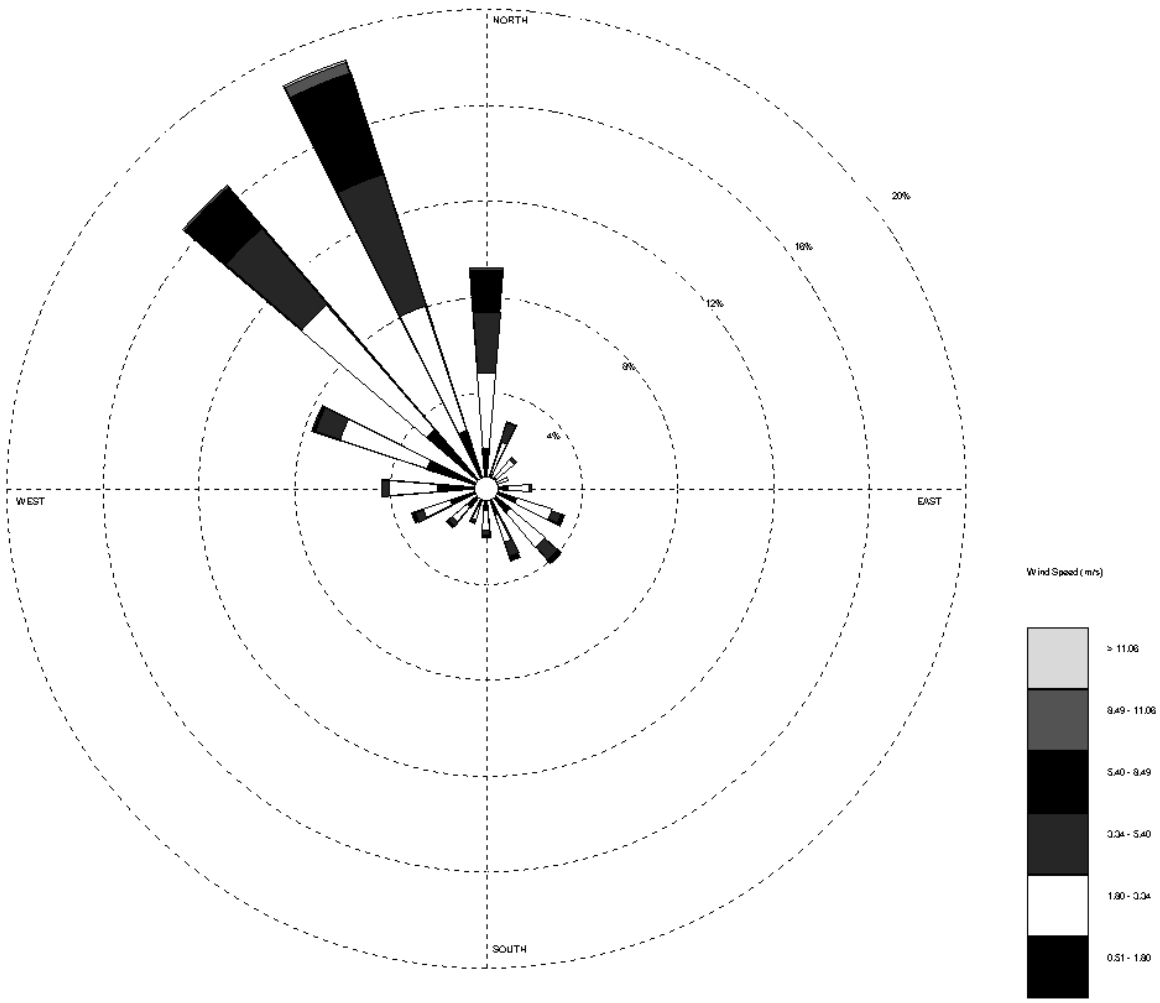


Figure 8.1-5b
First Quarter Wind Rose for Lemoore Naval Air Station
Averaged Over Five Years: 1992-1995 plus 1997

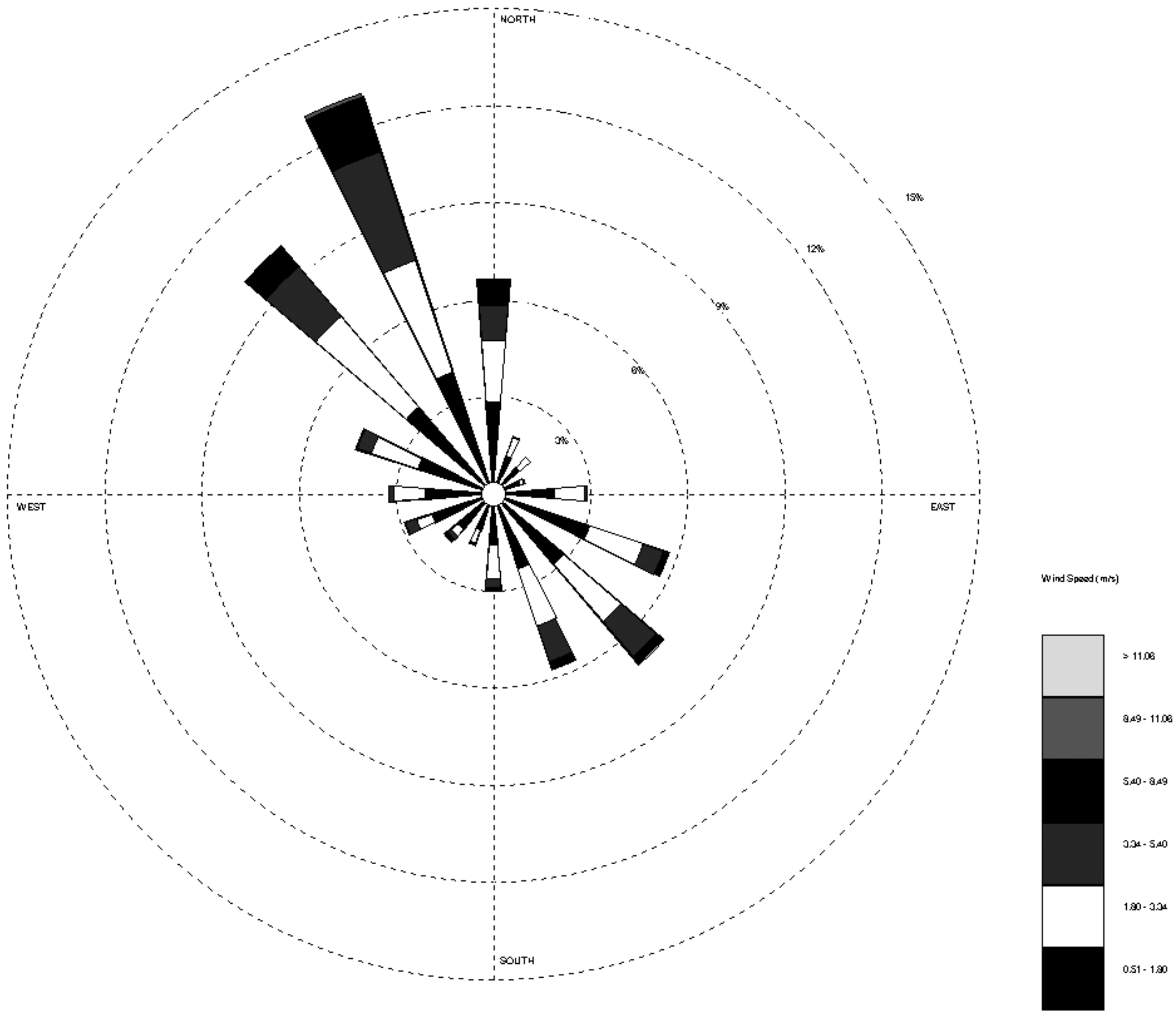


Figure 8.1-5c
Second Quarter Wind Rose for Lemoore Naval Air Station
Averaged Over Five Years: 1992-1995 plus 1997

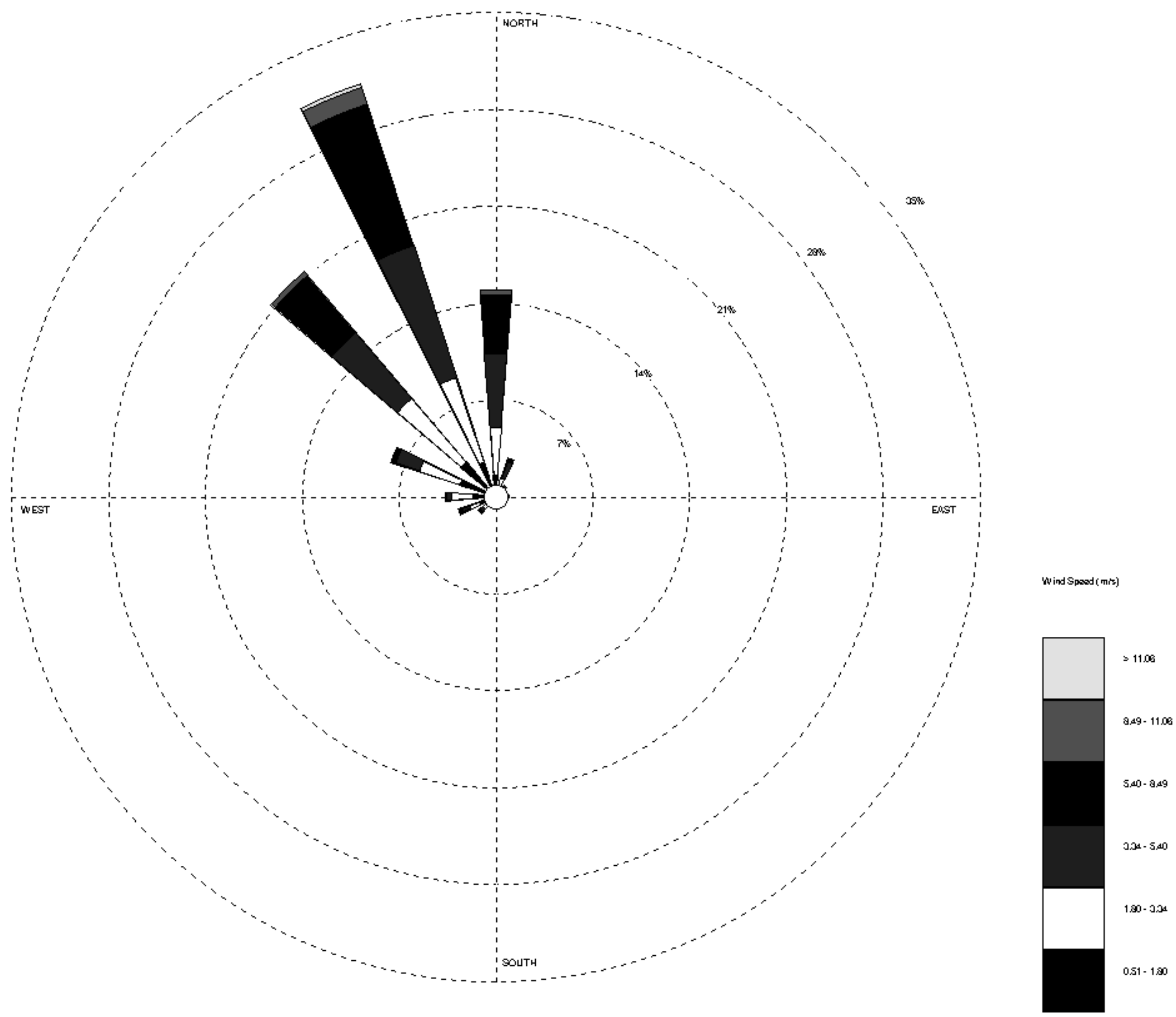


Figure 8.1-5c
Second Quarter Wind Rose for Lemoore Naval Air Station
Averaged Over Five Years: 1992-1995 plus 1997

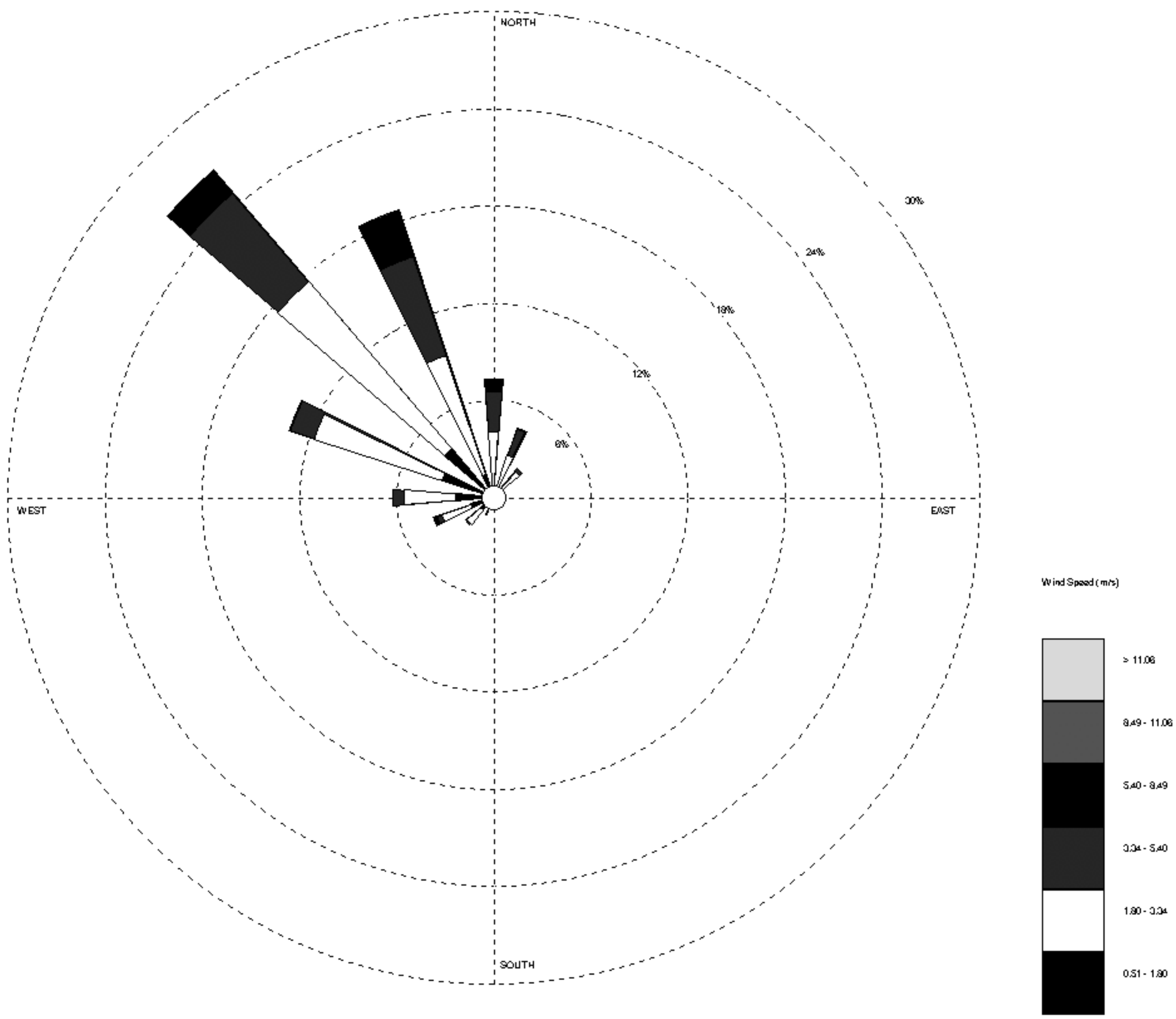


Figure 8.1-5d
Third Quarter Wind Rose for Lemoore Naval Air Station
Averaged Over Five Years: 1992-1995 plus 1997

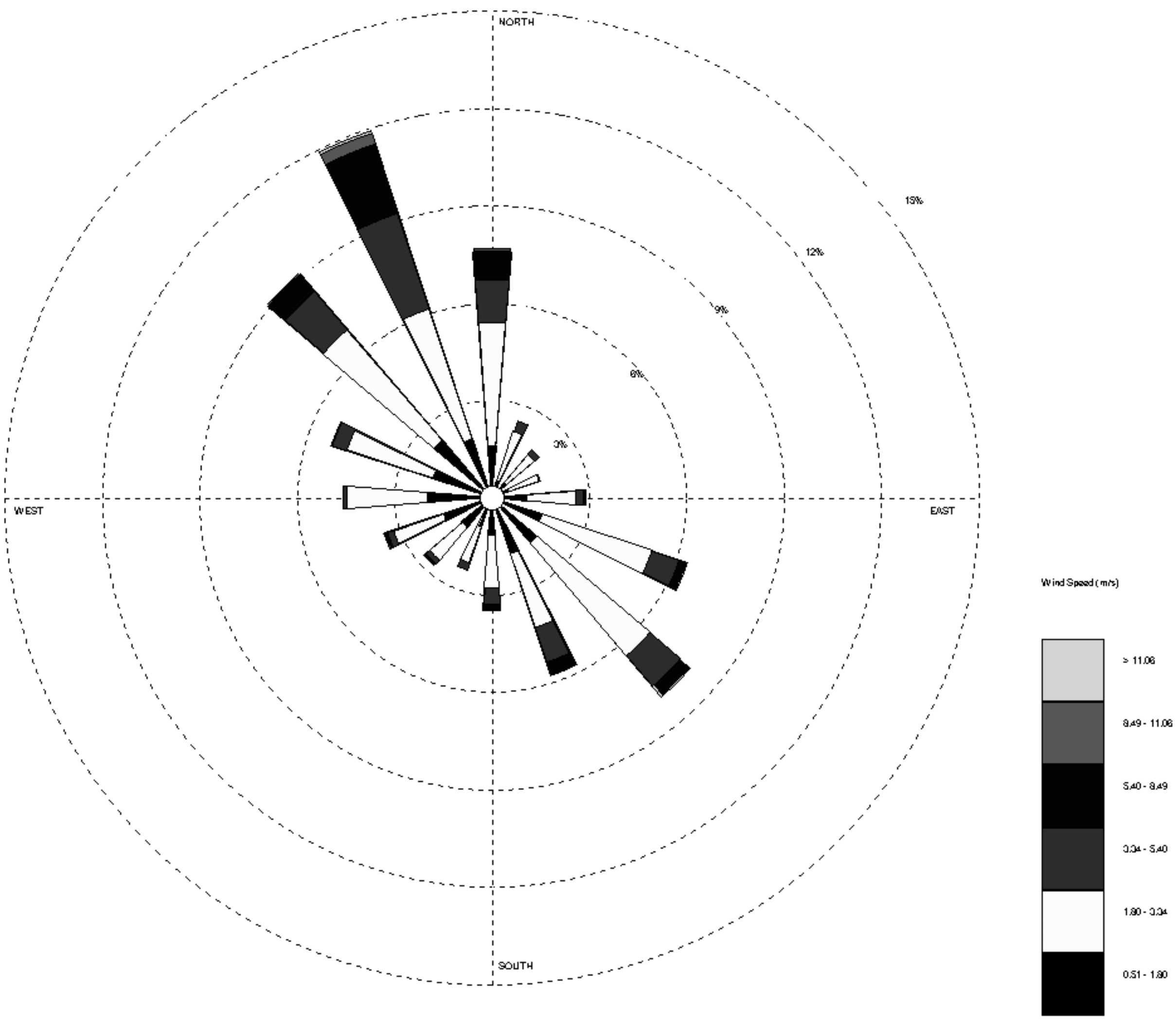


Figure 8.1-5e
Fourth Quarter Wind Rose for Lemoore Naval Air Station
Averaged Over Five Years: 1992-1995 plus 1997

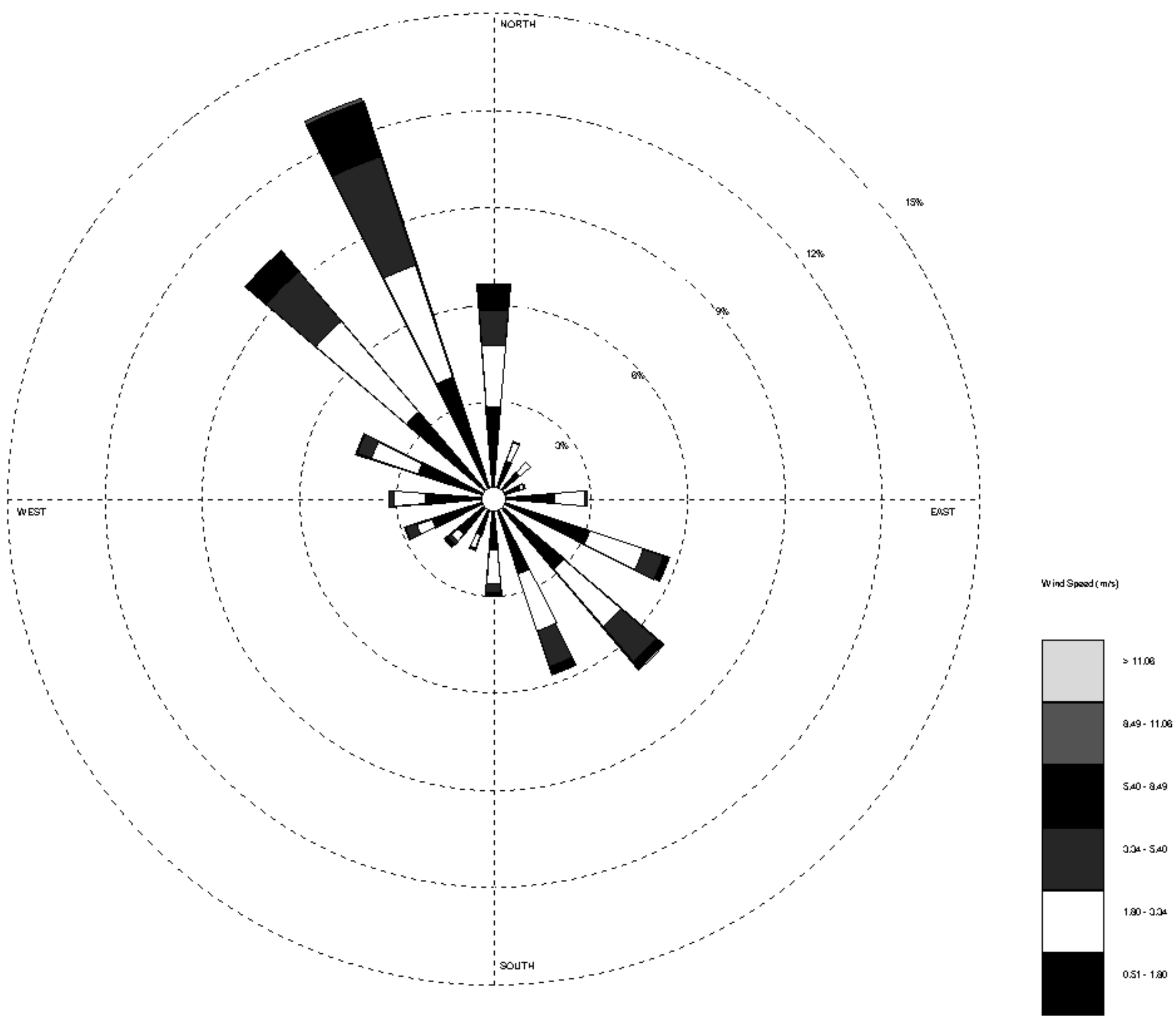


Figure 8.1-6
Maximum Hourly Ozone Levels in Fresno, 1991-2000

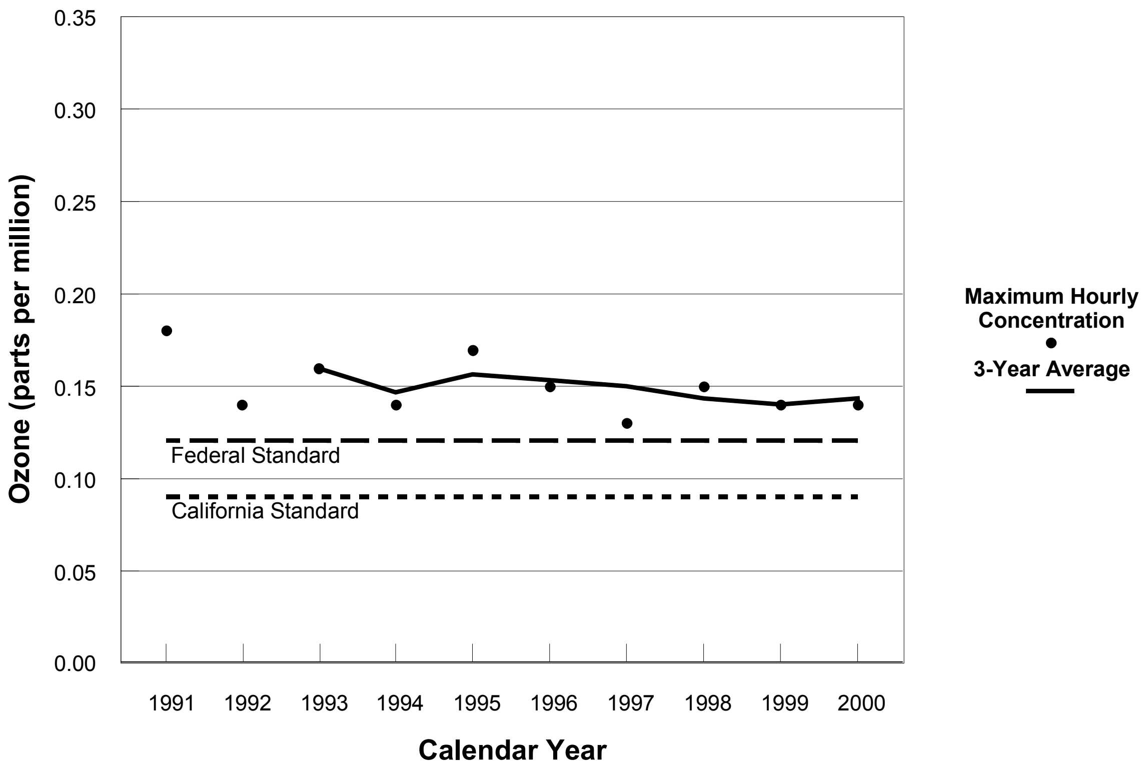


Figure 8.1-7
Violations of the State and Federal Ozone Standards, Fresno Monitoring Station, 1991-2000

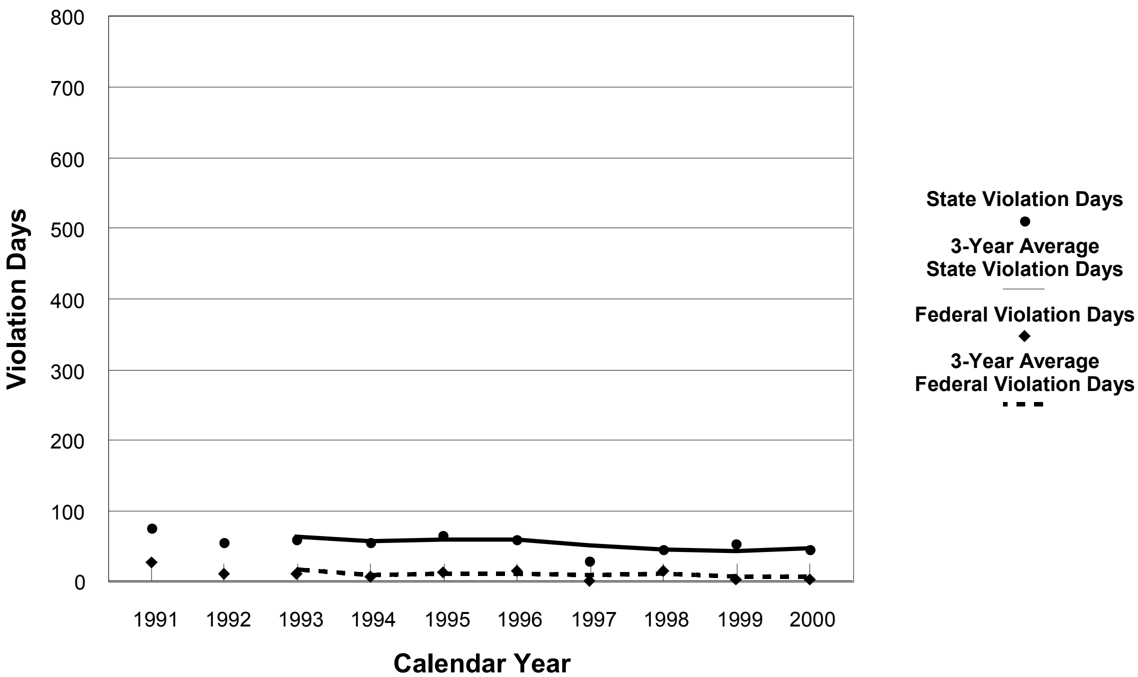


Figure 8.1-8
Maximum 1-Hour Average NO_2 Levels in Fresno, 1991-2000

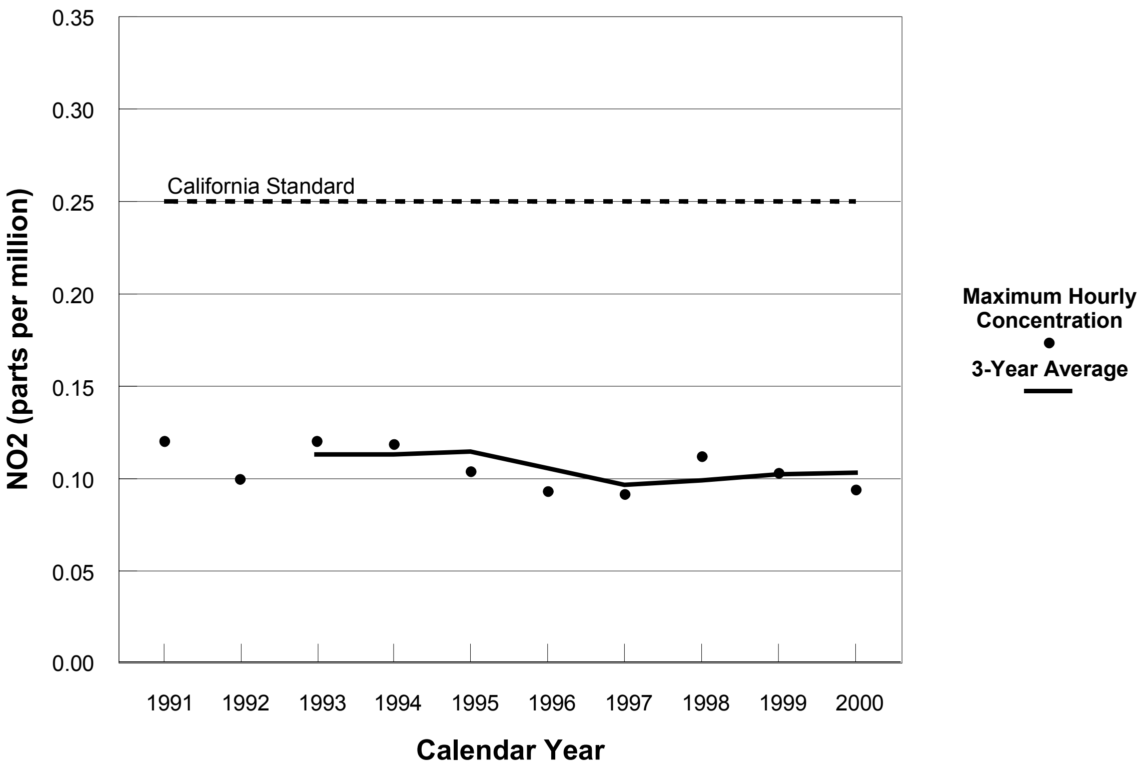


Figure 8.1-9
Maximum Eight-Hour Average CO Levels in Fresno, 1991-2000

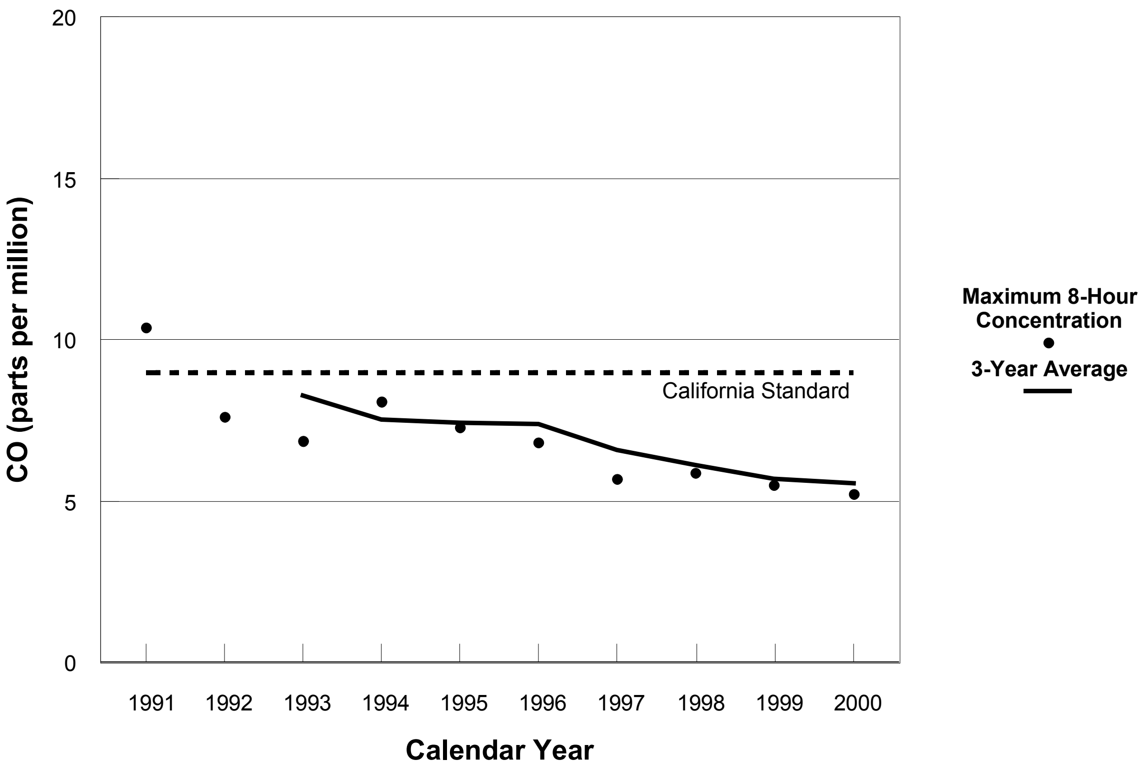


Figure 8.1-10
Maximum One-Hour Average CO Levels in Fresno, 1991-2000

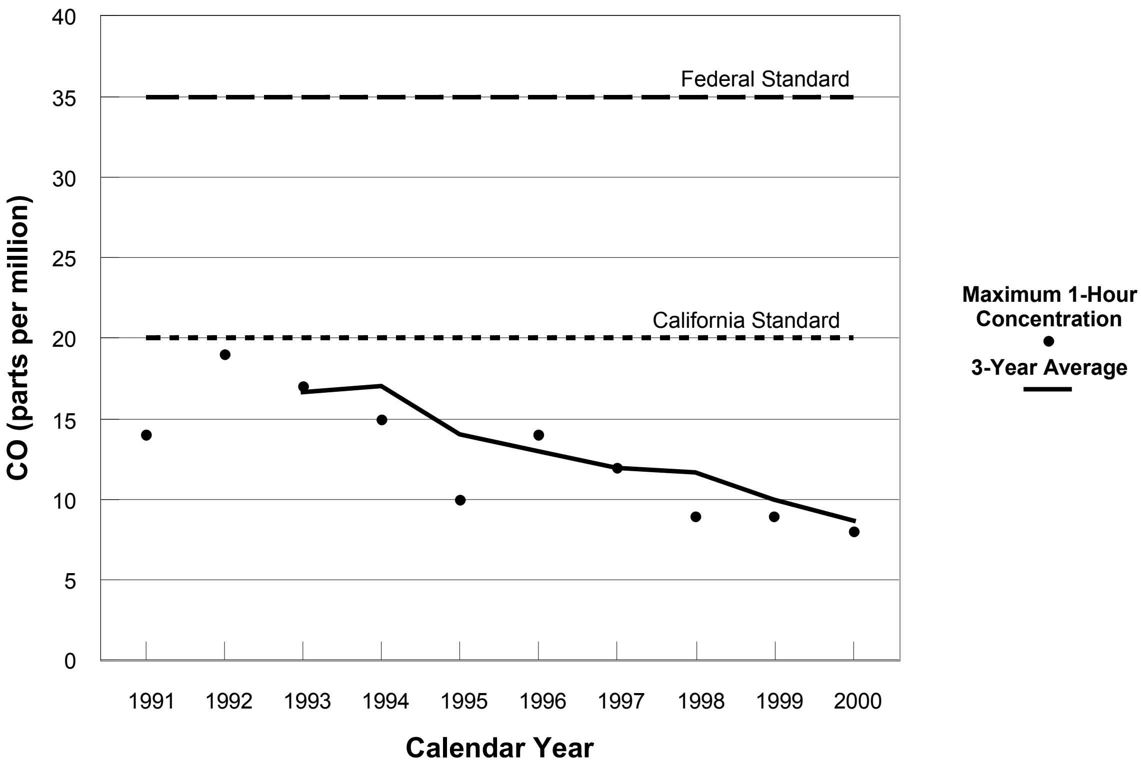


Figure 8.1-11
Maximum One-Hour Average SO_2 Levels, 1st Street, Fresno, 1991-1997, and Bakersfield, 1999-2000

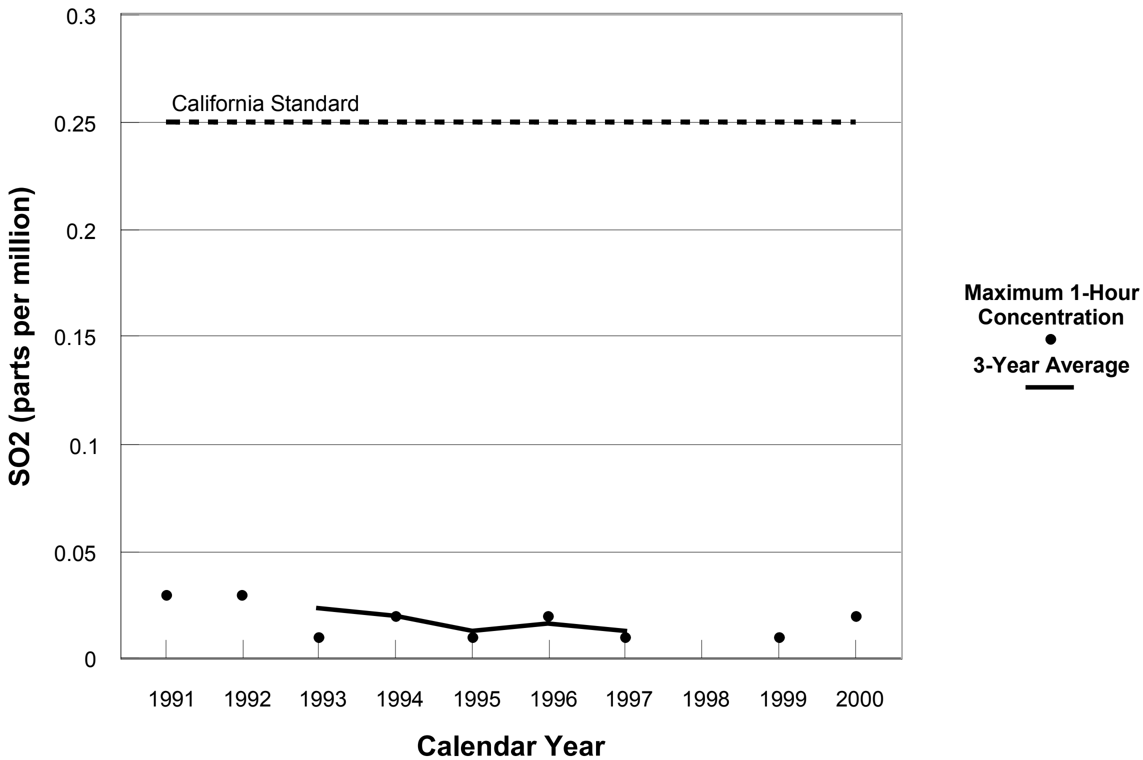


Figure 8.1-12
Maximum 24-Hour Average Particulate Sulfate Levels in Bakersfield, 1990-1997

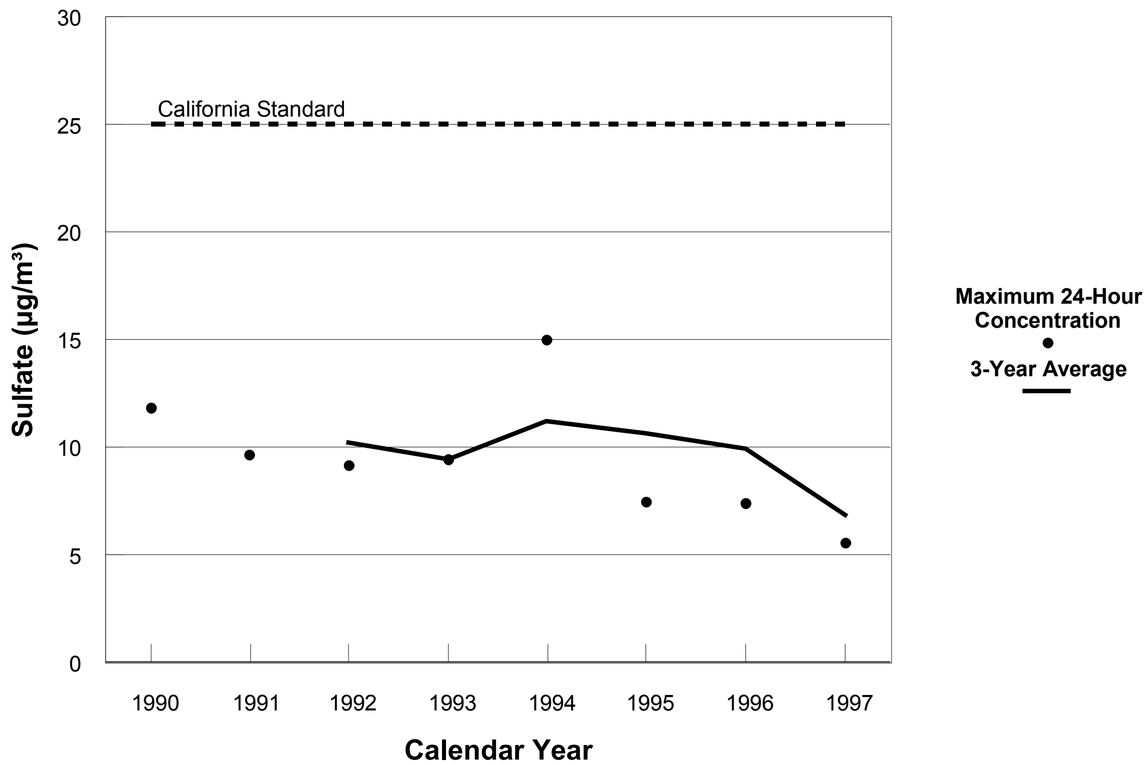


Figure 8.1-13
Maximum 24-Hour PM_{10} Levels in Fresno, 1991-2000

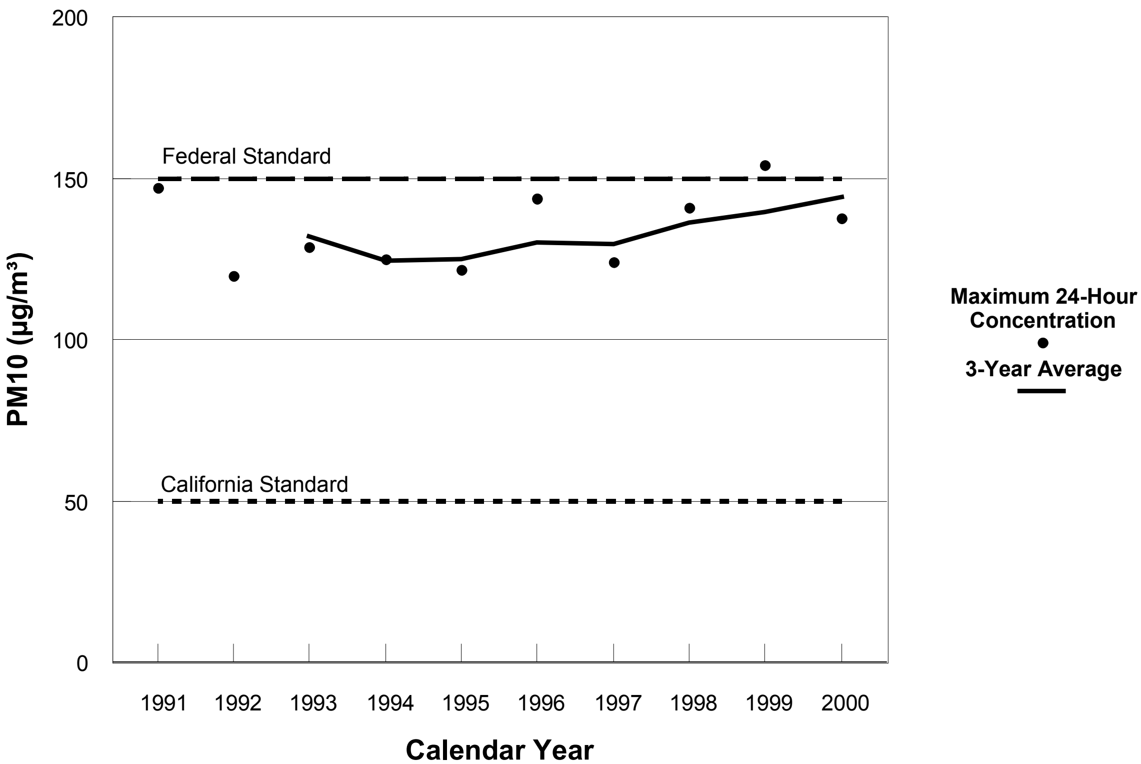


Figure 8.1-14
Expected Violations of the California 24-Hour PM_{10} Standard (50 $\mu g/m^3$), Fresno, 1991-2000

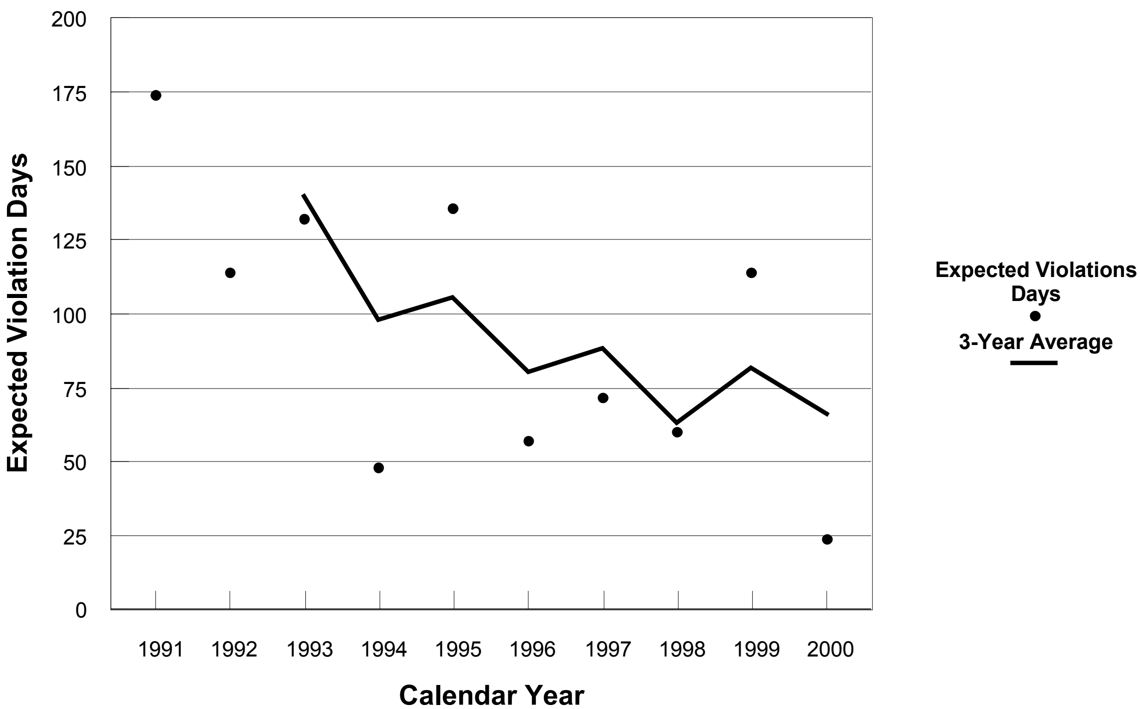


Figure 8.1-15
Maximum 24-Hour $PM_{2.5}$ Levels, Fresno, 1991-2000

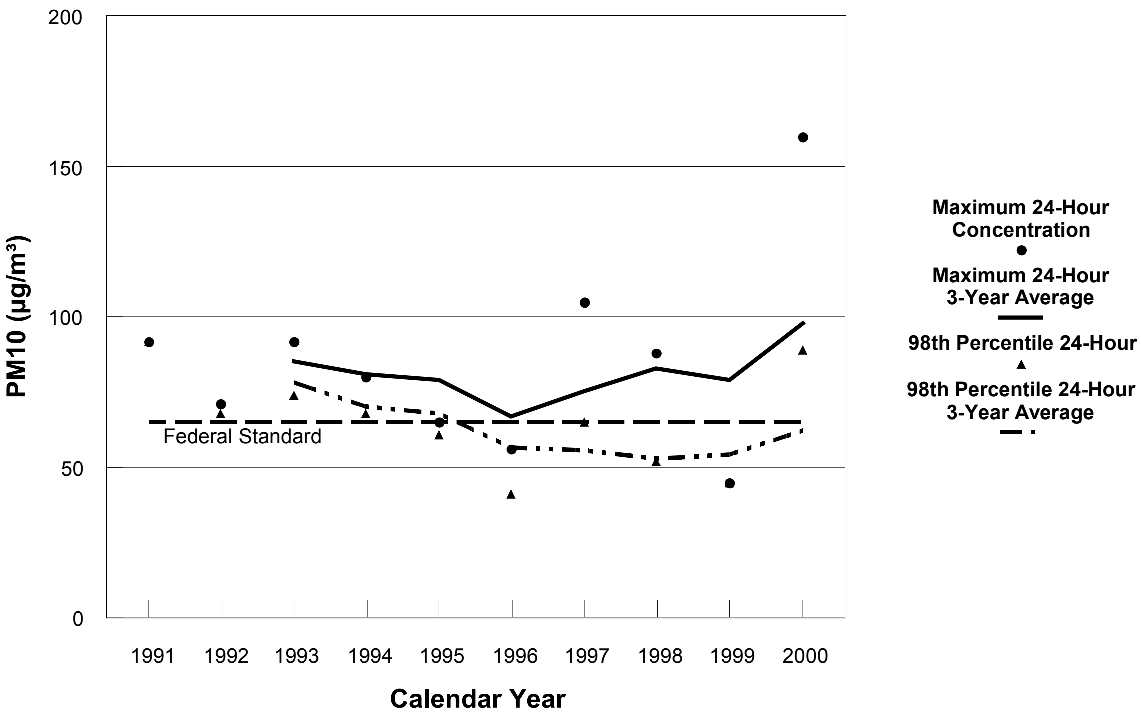


Figure 8.1-16
Lead Levels in the Central Valley, 1991-2000

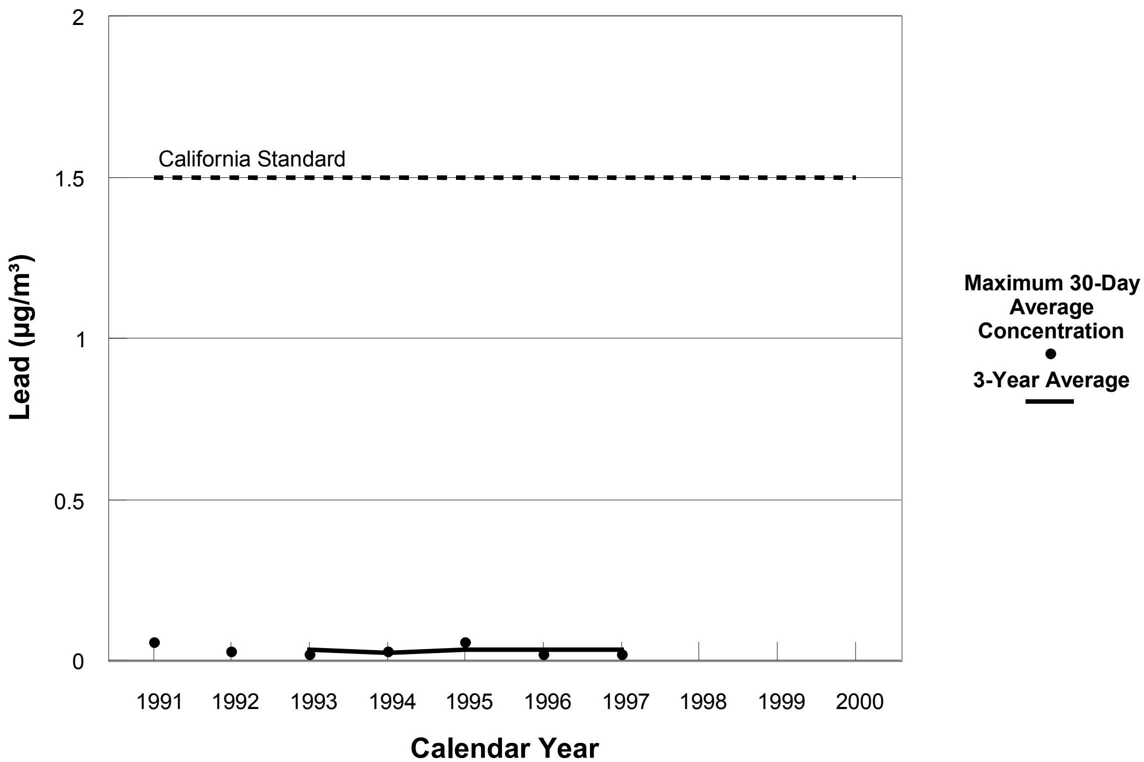


Figure 8.1-17
Locations of the Project Site and the Lemoore NAS Monitoring Station

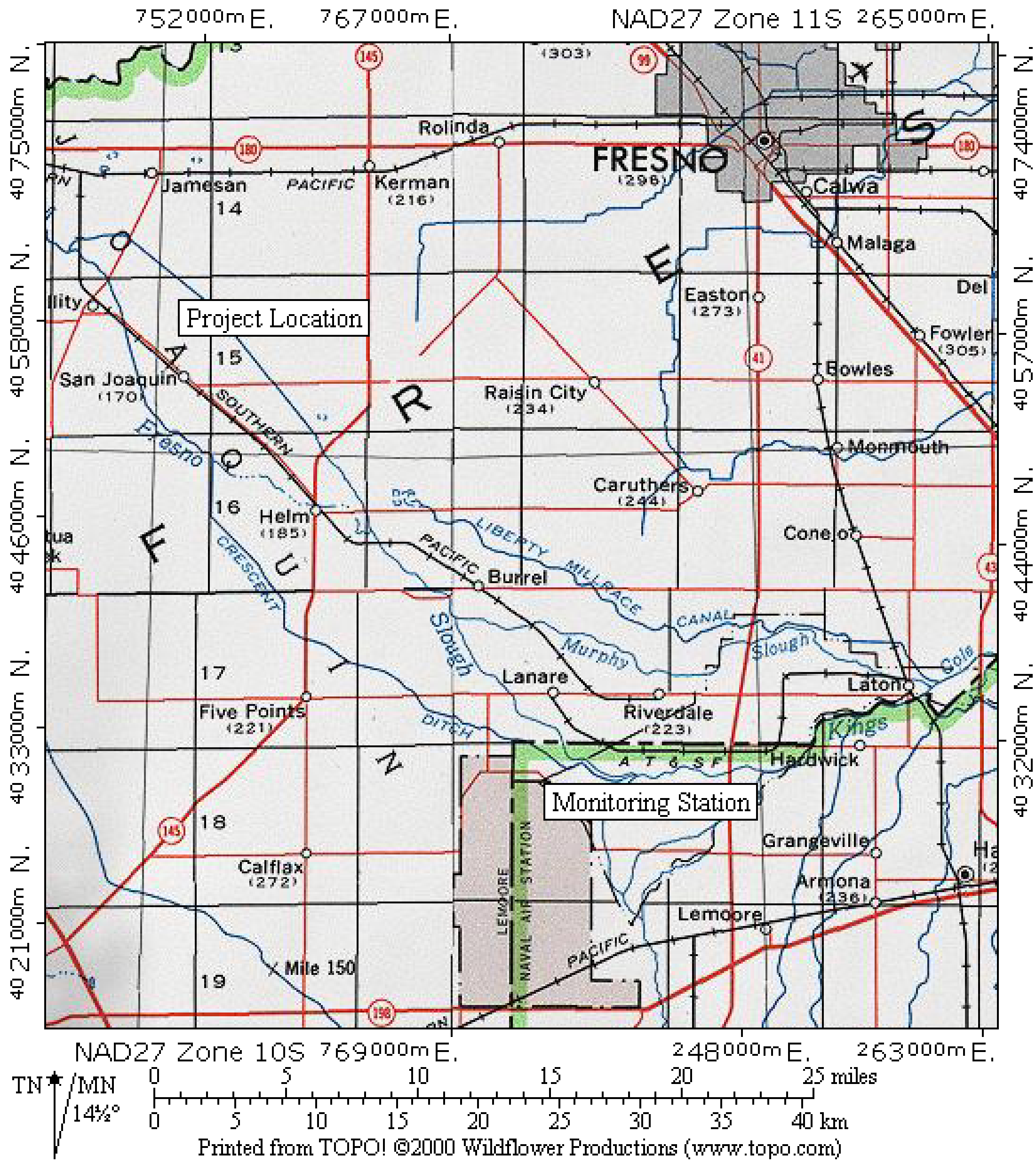
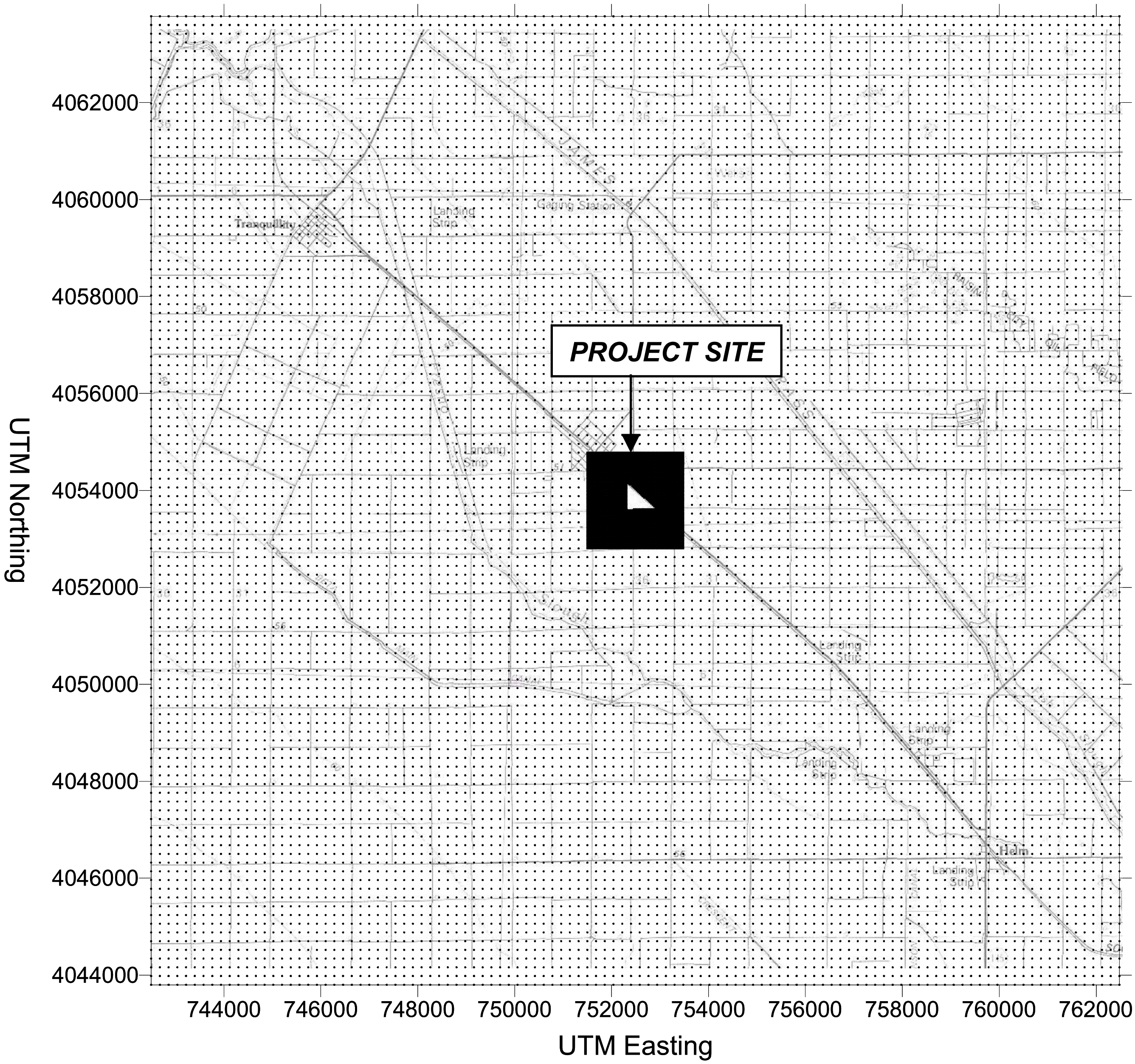


Figure 8.1-18


PROJECT SITE
Tranquillity
Landing Strip
Gaging Station
Helm
4062000
4060000
4058000
4056000
4054000
4052000
4050000
4048000
4046000
4044000
UTM Northing
744000
746000
748000
750000
752000
754000
756000
758000
760000
762000
UTM Easting